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ABSTRACT

Medical laboratory science, occupational therapy, and physiotherapy programs in the United Kingdom (U.K.) are described, and guidelines concerning the academic placement of students from these programs who wish to study in U.S. institutions are provided. For each of the programs, attention is directed to the relevant professional bodies, career structure, academic program timetables, certificate and diploma programs, degree and advanced programs, and developments in professional training. Appendices include: a list of institutions offering approved programs in medical laboratory science, titles of theses for fellowships in medical laboratory science since 1968, an outline of a course on management of science departments, overseas qualifications accepted for registration of medical laboratory technicians by country, the syllabi for the intermediate and final examinations in medical laboratory science, a list of programs in the U.K. approved by the College of Occupational Therapists and Entrance Requirements for each program, approved syllabus for the basic diploma in occupational therapy, a list of physiotherapy training programs and syllabus of studies approved by the Chartered Society of Physiotherapy, and a list of requirements for the state registration of physiotherapists trained abroad. (SW)

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Alan M. Margolis, Thomas J. Monahan

HE 017 806

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A Study of These Programs and a Guide to the Academic Placement of Students from These Programs in Educational Institutions of the United States

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Preface

This volume represents a departure from the standard World Education Series approach in that it is oriented towards specific fields of study rather than towards a country's educational system. The volume is an experimental work in two significant ways. First, because it does not deal with the structure and substance of the British educational system in great detail, it presupposes a familiarity with education in the United Kingdom beyond a rudimentary level; such prior knowledge of an educational system has never been presumed in the preparation of other WES volumes.* Second, this work has a limited scope—the presentation of a complete picture of three professional fields in order to serve the foreign student admissions officer, the professional school admissions person, *and* the official state licensing officer. To assist this latter audience, syllabuses and regulations have been reproduced in great detail.

In the United States there is a great need for information concerning the training programs in many allied health professions as they are conducted in other countries. From within a wide spectrum of possible fields, the authors selected three about which there is a dearth of substantive information in the U.S. The United Kingdom was chosen as the country for the study because a large number of Commonwealth nations either subscribe directly to the British qualifications or base their own programs on the British model.

The World Education Series Committee, the editors, and the authors, especially, would like to have the reactions of readers to this new type of volume. Those with opinions or suggestions may write to the Committee Chairperson, c/o AACRAO (One Dupont Circle, N.W., Washington, D.C. 20036).

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*The reader is directed to two works which will provide valuable information on the British educational system: Stephen H. Fisher, *The United Kingdom of Great Britain and Northern Ireland: A Study of the Educational System of the United Kingdom and a Guide to the Academic Placement of Students in Educational Institutions of the United States*, World Education Series (Washington, D.C.: American Association of Collegiate Registrars and Admissions Officers, 1976), and Barbara Priestley, *British Qualifications: A Comprehensive Guide to Educational, Technical, Professional, and Academic Qualifications in Britain* (London: Kogan Page).

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This volume represents the joint efforts of several persons other than ourselves. We should like to thank the book's (and our) prime movers.

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Our editors —Lucy McDermott & Paula Eurenius
Our reader —Inez Sepmeyer

and especially our wives Susan and Linda.

Alan Margolis
New York, New York

Tom Monahan
Albany, New York

January 1980

Chapter One

An Up-Front Glossary

The material in the following chapters presupposes a familiarity with the form and substance of the British educational system. Although it is not the purpose of this volume to present an outline of this system except as it applies to the three fields of study being discussed, the glossary which follows explains the most important terms used in the volume, but not defined therein.

The reader might wish to use in conjunction with this volume two publications (cited earlier) which deal in detail with the British educational system: *British Qualifications*, compiled by Barbara Priestley, and *United Kingdom* by Stephen H. Fisher.

associate membership (or associateship)—a level of membership in a professional society usually superior to student or ordinary membership but inferior to fellowship. Associate membership is an earned rather than an honorary status and is, in certain fields, the professional level required for registration.

block-release scheme—a pedagogic timetable used for the formal classroom component of lower and middle level technicial, commercial and vocational programs. This scheme consists of a release from employment for the purpose of study for a period varying from several weeks to several months, depending upon the program. The employment is in the same field as is the training program. Usually, the employment is a prerequisite for the program, and the program is a prerequisite for advancement in the profession. The block-release scheme is used by teaching institutions as an alternative to the day-release scheme (see below).

Certificate of Secondary Education (CSE)—an examination system for those completing the Fifth Form of secondary school. This system is an alternative to the General Certificate of Education (GCE). It differs from the GCE in that there is no requirement that schools follow external syllabuses or an external examination system. Schools may opt for completely external assessment (both syllabus and examinations), for totally internal assessment, or for a combination of internal syllabuses and external examination. The grading system ranges from 1 (highest) to U (ungraded/failure) with 5 being the lowest passing grade. Although geared somewhat lower than the GCE in expectation of student attainment, a grade of 1 on the CSE may

be said to be marginally comparable with a pass on the GCE Ordinary level examinations.

chartered universities—postsecondary institutions which have official government charters to offer university level degrees. University degrees differ from individually approved degree programs which are offered at non-university, but postsecondary, institutions with the approval of the Council for National Academic Awards (see below).

college—a term referring to an educational institution either at the secondary or postsecondary level. The term does not define the level of education. In addition, the term is used for an institute or association—e.g., the College of Speech Therapists, the professional association in the field of speech therapy.

Council for National Academic Awards (CNAA)—a quasi-official agency, chartered in 1964, charged with the responsibility of awarding degrees for programs taken in non-university institutions. The CNAA must approve the specific program for the degree; it does not approve the institution for the purpose of granting degrees.

Council for Professions Supplementary to Medicine (CPSM)—an official agency having the general function of coordinating and supervising the activities of eight professional Boards—chiropodists, dieticians, medical laboratory technicians, occupational therapists, orthoptists, physiotherapists, radiographers, and remedial gymnasts. The Boards have the general function of promoting high standards of professional education and conduct among the members of the professions. The Boards accomplish their aims by establishing, maintaining and publishing registers of qualified practitioners; by exercising the power to approve courses of training, qualifications and training institutions; and by removing from the register those "found guilty of infamous conduct in a professional respect." (The Council for Professions Supplementary to Medicine, *Members Handbook*, p. 2.)

day-release scheme—a pedagogic timetable for the formal classroom component of lower and middle level technicial, commercial and vocational programs. This scheme consists of a release from employment of one day a week for a period of several months to a year or more, depending on the program, for the purpose of study. The employment is in the same field as the training program. Usually, the employment is a prerequisite for the program and the program is a prerequisite for advancement in the profession. This pattern is used by teaching institutions as an alternative to the block-release scheme (see above).

external candidate—an individual who sits for an examination but is not coming directly from an academic program which prepares for that examination. Usually, external candidates study independently in order to prepare for the examination.

external examination system—a testing system meant to standardize the teaching of a particular body of knowledge. The examining body may be

an organization established for this purpose—e.g., the City and Guilds of London Institute—or a professional body such as the Institute of Medical Laboratory Sciences. Syllabuses for external examinations may be set externally or internally (at the school).

fellowship—usually the highest level of membership in a professional society. Fellowship may be earned or may be honorary and is, in certain fields, the professional level required for registration.

General Certificate of Education (GCE)—an external examination system which sets both syllabuses and examinations for two levels of pre-university education. The lower level is the Ordinary or O level. This examination is normally given to those who have completed Form V. Passes in five academic subjects at this level normally are considered as equivalent to the receipt of a U.S. academic high school diploma. Grades of A, B, and C are passes. The higher—Advanced or A—level is administered to those who have completed Form VI (two years of full-time coursework beyond Form V). Freshman year credit in subjects passed at this level is usually granted by U.S. colleges and universities. Grades of A-E are passes. Those who may not have the formal educational background or who have been out of school several years may sit for either level of examination, at the discretion of the examination board, as external candidates.

institutes and colleges of technology/polytechnics—educational institutions which offer technical programs ranging from introductory, short-term courses to degree programs approved by the Council for National Academic Awards. The programs may meet external examination standards or be totally internal. Although polytechnics historically have offered a greater proportion of more advanced programs than institutes of technology, for U.S. readers the level and nature of the program rather than where it is taught is of prime importance.

qualification—This is used as a generic term in British education. It means a formally obtained educational attainment which prepares a person for further education, employment, etc.

registration—licensing; meeting the requirements for practicing a profession in the public sphere.

sandwich scheme—a pedagogic timetable used for the formal classroom component of higher level technical programs. This scheme consists of alternating periods of full-time employment and full-time classwork (both the employment and the classwork being in the same field). Usually, there is some articulation between the academic and practical training components.

student membership—an entry level of membership in some professional societies requiring attendance in an approved training program. Student status usually leads to ordinary and/or associate membership (depending upon the field) upon completion of appropriate formal training.

Chapter Two

Medical Laboratory Science

The Field Defined

Medical laboratory science (the word "science" has replaced the word "technology" in Britain) characterizes itself as the "right arm of medicine." It is a profession which provides physicians and researchers with the information to make a wide range of professional decisions. In Britain, the field is divided into four areas of specialization:

- Chemical pathology—the investigation of biological material in health and disease. Specifically, it is concerned with the following: the diagnosis of diseases which influence the metabolism of the body; hormone disturbances; and toxilogical investigations and the control of some form of treatment.
- Hematology—the study of blood and the various cells it contains.
- Histopathology—the study of tissues from both living and dead subjects.
- Medical microbiology—the isolation and identification of viruses, bacteria and other micro-organisms from patients.

Technologists (now called "scientific officers") work in laboratories of the National Health Service, the Medical Research Council, the Blood Transfusion Services, the Public Health Service, the Ministry of Agriculture, Fisheries and Food, and in universities and the pharmaceutical industry.

Professional Bodies

The Institute of Medical Laboratory Science (IMLS) is the professional body which provides opportunities for recognition of members by authorizing levels of membership based on increasingly higher levels of competency (see Table 1). In essence, it supervises the professional activities of its 15,000 members. In addition, it publishes periodicals, maintains a library service for members, provides project grants, and represents the membership on a number of professional boards.

The Medical Laboratory Technicians Board (MLTB) is that arm of the CPSM which sets laboratory standards and registration qualifications in medical laboratory science.

THE TECHNICIAN EDUCATION COUNCIL (TEC) is a new organization, established in 1973, whose intent it is to standardize academic programs by awarding technical certificates at different levels to students who have followed approved programs. These programs will be approved if they encompass the units (actually "courses" in the U.S. sense) set by the TEC. Presently, the TEC certifies programs at a level comparable to the Ordinary National Certificate (ONC). It is planned that TEC-certified programs comparable to the Higher National Certificate/Diploma (HNC/HND) level will begin in 1980. In the not too distant future, the TEC higher level certificates will supplant the HNC/HND and Part III City and Guilds of London Institute (CGLI) certificates in many technical areas, just as the TEC lower-level certificates have almost completely replaced the ONC/OND and the CGLI Part I and II technical certificates.

THE JOINT COMMITTEE FOR THE HIGHER NATIONAL CERTIFICATE AND DIPLOMA IN MEDICAL LABORATORY SUBJECTS establishes criteria for and monitors all higher-level programs resulting in HNCs and HNDs in medical laboratory subjects. It consists of the following organizations:

Department of Education and Science
Department of Health and Social Security
Institute of Medical Laboratory Science
Medical Laboratory Technicians Board
Public Health Laboratory Service Board
Royal College of Pathologists

THE JOINT COMMITTEE FOR ORDINARY NATIONAL CERTIFICATES AND DIPLOMAS IN SCIENCE sets up criteria for and monitors all ordinary national diploma and certificate programs in the sciences. The field of medical laboratory science is under its jurisdiction. The Committee is comprised of the following organizations:

Association of Principals in Technical Institutions
Association of Teachers in Technical Institutions
Association of Technical Institutions[1]
Department of Education and Science
Institute of Mathematics and Its Application
Institute of Medical Laboratory Science
Institute of Physics and the Physical Society
Institution of Metallurgists (in liaison with other metallurgical interests)
Ministry of Education (Northern Ireland)
Royal Institute of Chemistry

1. See Appendix A, at the end of the MLS chapter, for a list of institutions approved to offer programs (as of the 1978/79 academic year).

Career Structure

Progress in the field is based upon additional theoretical and practical knowledge as noted in Table 1.

Table 1

Grade and Salary Schedule for Medical Laboratory Scientific Officers (MLSO)

Grade Level	Salary Range in £/Annum	Minimum Entry Requirements for Grade Level	IMLS Level of Membership
Junior MLSO "A"	1905-2904	4 GCE O's/CSE Grade 1 (for ONC program), CSE Grade 3 (for TEC program)	Student
Junior MLSO "B"	2169-3015	ONC/TEC/GCE A's	Student
MLSO*	3201-4680	HNC/HND/B.Sc.†	Associate
Senior MLSO	4347-5769	‡	Fellow
Chief MLSO	5472-6192	‡	Fellow
Senior Chief MLSO	6063-7311	‡	Fellow
Principal MLSO	7311-8055	‡	Fellow

NOTE: In 1977 approximately 50% of those entering the field came with O levels, while 30% entered with A levels and 20% with bachelor's degrees.

*From this level upward, state registration is required.

†Laboratory component varies with entry qualification. See section on laboratory components for further discussion.

‡Starting with Senior MLSO, the profession becomes managerial and requires fellowship in the IMLS. Progression from Senior to Principal MLSO is based upon increased supervisory responsibility. See pp. 21-22 for a discussion of IMLS fellowship.

The Academic Programs

Levels of Academic Programs Leading to Registration

There are two levels of programs most medical laboratory students must complete in order to attain registration as medical laboratory scientific officers. Although it is possible to obtain the necessary academic training by other means, and this is discussed later in this chapter, the programs represent the normal progression.

First Level of Program:

Ordinary National Certificate (ONC)[2] *or*
Ordinary National Diploma (OND) *or*
Technician Education Council Lower Level Certificate (TEC Lower)

Second Level of Program:

Higher National Certificate (HNC) *or*
Higher National Diploma (HND) *or*
Technician Education Council Higher Level Certificate (TEC Higher)[3]

Program Timetables

The general scheme of a great many technical programs includes options for two year day-release or block-release timetables for ONC, TEC, and HNC programs, and three year full-time sandwich timetables for OND and HND programs. The OND and HND programs are relatively few in number; they provide students with a broader view of the particular field, giving them a greater percentage of theoretical material than is included in ONC, TEC, and HNC programs. In medical laboratory science, diploma and certificate courses are recognized as being equivalent to each other by the Council for Professions Supplementary to Medicine (CPSM).[4] The vast majority of medical laboratory science students opt for the day-release certificate program because it allows for the completion of required laboratory training while the academic training is going on.

Because certificate-holders are the students most likely to be seen by U.S. admissions officers (and also in an attempt to simplify a complex issue), this study will concentrate on the certificate programs. The OND and HND programs and their relationship with ONC and HNC programs are discussed in detail in the WES volume, *United Kingdom*.[5]

TEC (Lower) and ONC Programs

The first level of academic training is at the TEC (lower) and ONC level. Although these programs represent two separate examination systems, the outcome produces similar results. Both systems rely upon syllabus guides to assist training institutions in meeting the needs of the students and the technical professions. The difference lies in the method of assuring that these requisites are met. The ONC programs require externally set examinations, while all assessment in the TEC scheme is internal to the college with careful TEC control of the curriculum. The TEC (lower) and the ONC are similar programs preparing students with at least theoretical equality for entry into an HNC course and into the next grade of the profession.

2. ONC variant in medical laboratory science. The initials ONC will, in this chapter, mean this variant.
3. This program is still in the planning stage.
4. The CPSM is described in Chapter One, "Up-Front Glossary."
5. Fisher, pp. 98-100.

Entry Requirements into TEC (Lower) and ONC Programs. The CSE and GCE are examination systems with different intentions—the GCEs having the more intensive academic component—although entry requirements for the TEC (lower) and ONC programs often are stated using both. The TEC programs minimally require a Grade 3 on the CSE for entry. ONC nominally requires four GCE Ordinary (O) level passes with grades of A, B, or C, or a Grade 1 on the CSE. However, there are a number of alternative entry qualifications which provide indications of technical rather than general academic competence. With respect to both programs, it is necessary to be aware that the basic criterion for admission is the likelihood of success, not the possession of a specific academic qualification. In order to be accepted into either program, a candidate must be employed in a laboratory as a Junior Medical Scientific Officer "A."

One cannot assume that everything taught in these programs is postsecondary in either British or U.S. terms. The ONC, because it has more stringent admissions requirements, may be said to represent a higher proportion of postsecondary work than the TEC (lower). Table 6 indicates the TEC level I subjects which may be exempted on the basis of GCE O-level passes. The difference between these programs is qualitative. The TEC (lower) begins at an earlier educational level, requiring an additional 300 hours of instruction as an introduction to the sciences.[6] Although at entry the students' educational backgrounds are not equivalent, both programs bring the student to a level comparable to GCE advanced levels, but with a narrower, more technically oriented focus.

Program Form and Content. Both the ONC and the TEC (lower) programs are day-release and part-time and generally are divided into three 11-week terms. Typically, students are fully employed in a laboratory. They are given one day a week to attend school—morning, afternoon and evening—with as many as 10 hours of classes on that one day. The ONC can also be taken on a block-release basis—a period of several weeks required for the full course to be completed which in a sense is a study leave from the job. Those entering a TEC (lower) program with nominal entry requirements (the CSE, Grade 3) must complete a program of 900 hours of classwork spread over three years; those entering with appropriate O levels, usually mathematics and sciences, will be able to complete the program in two years.

Program of Study/Program Level Analysis. Both ONC and TEC (lower) courses are used to illustrate the type of education offered at entry (preprofessional) level. At the outset, note that the courses (see Tables 2 and 3) are examples of the recommended courses available to colleges; variations frequently are adopted at the discretion of the teaching institution. However, the basic requirements as set by the Joint Committee for Sciences or the TEC must be met. Each ONC course is a complete course in itself; for example, the ONC program of study in biological sciences is made up

6. See Tables 2-5.

Table 2

TEC (Lower) Model Program for Medical Laboratory Science

Title of Unit (Roman numeral indicates level of course)	Unit Credit	Hours
General & Communications Studies	2½	150
Biology I (B)	1	60
Chemistry I	1	60
Physics I	1	60
Mathematics I	1	60
Mammalian Physiology II	1	60
Cell Biology II	1	60
Chemistry II	1	60
Mathematics (1) II	½	30
Medical Laboratory Science II	1	60
(Physics II)*	(½)	(30)
(Statistics II)*	(½)	(30)
Mammalian Physiology III	1	60
Biochemistry III	1	60
Medical Laboratory Science III	2	120
	*15	*900

*These two subjects are recommended but not currently being used. Therefore, they do not appear in the totals.

Table 3

ONC Model Program for Medical Laboratory Science

Course	Hours
English and General Studies	120-180
Basic Biology	120
Basic Chemistry	120
Physics-with-Maths Physics (60 hours) Maths (60 hours)	120
Medical Laboratory Science	120
	600-660

of subjects devised especially for biology or medical laboratory science. The TEC structure is quite different. For example, rather than design one math course for polymer technology, one for physics laboratory technology, and one for medical laboratory science, the TEC designs math units which can be used for all programs. Thus, Mathematics I, Mathematics Syllabus 1-II, and Mathematics Syllabus 2-II may be utilized in appropriate combinations to satisfy all TEC programs. The TEC units are building blocks, which are combined in different ways to make a variety of courses of study. TEC course levels are noted as I, II, III, in ascending order of academic difficulty. Programs may use double or half units. Each unit is equal to 60 hours of instruction, a half unit to 30 hours of instruction, and a double unit to 120

Table 4

Comparison of ONC/TEC (Lower) Subjects by Hours

Subject	TEC	ONC
English/General Studies	150	120-180
Biology	240	120
Chemistry	180	120
Physics*	60	60
Mathematics†	90	60
Medical Laboratory Science	180	120
	900‡	600-660

*Does not include TEC Physics II, a planned but not operative half unit.
†Does not include TEC Statistics II, a planned but not operative half unit.
‡Does not include 60 hours of planned but not operative units.

Table 5

Distribution of TEC (Lower) Units by Level

Level	Units	Hours	% of Total
I	6½	390	43
II*	4½	270	30
III	4	240	27

*Does not include Physics II or Statistics II (see Tables 2 and 4).

hours. The half-unit concept exists so that portions of the subject matter of a unit, applicable to the particular discipline, may be used and the remaining, irrelevant, portions eliminated.

An educational institution desiring to offer TEC programs submits to the TEC its program which must include the appropriate TEC units. The TEC will validate that college's program and assign a moderator to assure that the Council's requirements are being met. Each college must present evidence that it follows established procedures to process exemptions from required TEC units. Note from the sample TEC Certificate shown that all units required for the program are listed, including those from which the student has been exempted. Upon request, individual colleges will provide the title of the qualification serving as the basis for any exemption. College records (when available) may not be identical to the TEC Certificate, as colleges may adapt units, add to them, offer additional material, etc. However, the TEC moderator assures that all required units have been included.

TECHNICIAN EDUCATION COUNCIL
CERTIFICATE

in POLYMER TECHNOLOGY

awarded to

who studied AT WILLIAM HUMBOLD COLLEGE OF POLYMER EDUCATION
FELLTOWN-ON-STOKE

The programme comprised the following

UNIT	LEVEL	GRADE
PHYSICAL SCIENCE	I	EXEMPT
MATHEMATICS	I	PASS
POLYMER PROCESSING (1 1/2 UNIT)	I	MERIT
WORKSHOP PROCESSES AND MATERIALS	I	EXEMPT
ENGINEERING DRAWING (HALF UNIT)	I	MERIT
PHYSICAL SCIENCE	II	EXEMPT
POLYMER PROCESSING (DOUBLE UNIT)	II	MERIT
POLYMER PROCESS ENGINEERING (HALF UNIT)	II	PASS
MATHEMATICS I (HALF UNIT)	II	PASS
POLYMER TESTING (HALF UNIT)	III	MERIT
POLYMER SCIENCE II 1/2 UNIT)	III	PASS
POLYMER TECHNOLOGY - MINORS (DOUBLE UNIT)	III	PASS
GENERAL AND COMMUNICATION STUDIES A	-	PASS
GENERAL AND COMMUNICATION STUDIES B	-	PASS

DATE OF AWARD JUNE 1978

Chairman

Chief Officer

No. 000001

990001-78-01/10393A/600300/0180390

Document No. 1

TEC Level I Courses

Both a review of the syllabuses and a view of Table 6 indicate that the intent of Level I units is to bring those students who enter without the appropriate GCE O levels up to a standard that will permit them to do higher level work. All Level I units, therefore, may be considered comparable to high school work. The fact that an O-level pass results in an exemption in that subject area does not mean that all of the O-level syllabus has been covered; TEC Level I courses have much more limited objectives, offering coursework relevant to the technology being studied.

Table 6

TEC Programs—Recommended Exemptions Based on GCE O Level or CSE Pass*

Subject	TEC Exempted Unit Hours	Exemption Based on Successful GCE/CSE Exam Results*
Biology I (B)	60	Biology, Human Biology
Chemistry I	60	Chemistry
Physics I	60	Physics, Engineering Science, Physical Science
Mathematics I	60	Mathematics

*GCE O-level grades A-C; CSE Grade 1.

TEC Level II/Basic ONC Courses

It is more difficult to assess the standard of coursework in this intermediate level. In general, it can be said that the TEC Level II and Basic ONC courses contain some postsecondary (in U.S. terms) work; however, it cannot be assumed that all the work is beyond high school level. Some Level II coursework may be representative of O level, rather than more advanced work. The two Mathematics II syllabuses in Table 7 exemplify this situation.

Table 7

Comparison of TEC Mathematics II (Syllabus 1) and TEC Mathematics II (Syllabus 2) By Teaching Units

Mathematics II Syllabus 1		Mathematics II Syllabus 2*	
Algebra	20%	Calculus	50%
Graphs	45%	Graphs	50%
Statistics	20%		
Trigonometry	15%		

*Not an MLS unit. It is used here for comparative purposes only.

More of Mathematics II, Syllabus 2, appears to be postsecondary than Mathematics II, Syllabus 1—if intermediate algebra and trigonometry are considered as high school-level subjects. Since Level II subjects span two levels of education and since U.S. institutions deal differently with these marginal courses—some offering college credit for algebra and trigonometry—an institutional review of the syllabus should be made before arriving at a decision on advanced standing. Medical Laboratory Science II, requiring as it does Biology I, Chemistry I, and Physics I as prerequisites, may be classified as a Level III subject for the purposes of considering advanced standing credits.

TEC Level III/ONC Elective Courses

Either because of their highly specialized nature or because sequentially they are at a relatively high level, TEC Level III and ONC elective courses are postsecondary.

Tables 8 and 9 provide detailed information on the content of the medical laboratory science subjects offered both by TEC and ONC programs.

The TEC and ONC systems differ in the pedagogic approach to the implementation of their syllabuses. Note that the ONC program states specifically the amount of required laboratory work; the TEC merely suggests that demonstrations and laboratory work might be the best approach, leaving the distribution of time spent in such activity in the hands of the training college. Twenty percent of the TEC examination for Medical Laboratory Science II is practical, while 35% of the examination for Medical Laboratory Science III is practical.

Examination Systems. As noted earlier, the TEC is not an examinations body; it sets syllabuses rather than examinations. The burden for testing rests with the educational institution offering the TEC-approved program. The ONC/OND (and the HNC/HND programs) are assessed externally, with the teaching institution setting the examination.

The following questions, drawn from an ONC examination, demonstrate the expectations of the program.

THEORETICAL QUESTIONS

1. "Under adverse conditions certain bacteria form spores to protect their species from extinction." Discuss the truth of this statement.
2. Give an account of the role of endocrinal factors in the regulation of the blood-sugar level in the mammal.
3. Outline the principles of the methods of identification used in the "ABO" system of blood grouping.

PRACTICAL QUESTIONS

1. Carry out an experiment to compare the properties of the hemoglobin derivatives A and B and select the one you would consider most suitable for use as a standard in the colorimetric determination of hemoglobin.
2. Make a permanent preparation of the paraffin section provided by the method given.

Table 8

TEC Medical Laboratory Science Course Syllabus

Subject Areas	Approximate Hours
Medical Laboratory Science II	
Role of MLS in Contemporary Medicine	4
Safety in the Laboratory	13
Collection of the Specimen	8
Sterilization and Disinfection	12
Laboratory Material and Equipment	23
	60
Medical Laboratory Science III	
Hematology—composition of blood, cellular components of blood, hemoglobin, cell counting, hematological Absolute Values, erythrocyte, sedimentation, normal hemostasis and blood, coagulation, hemorrhagic disorders.	23
Blood Group Serology and Transfusions—procedures, immunology as relevant to blood group serology, inheritance and serological factors of ABO groups, and Rhesus (D) factor, blood grouping, production of ABO grouping sera, collection and storage of blood for transfusions.	23
Clinical Chemistry—gastric and pancreatic digestion, kidney functions, renal functions, plasma and hemoglobin as oxygen carriers, carbon dioxide in the blood, blood gas tension, cerebrospinal fluid.	23
Medical Microbiology—review of micro-organisms, culture media, bacteria, identification, host and parasite relationship, micro-organism transmission in infectious diseases, disease control.	23
Histopathology—fixation, processing of histological tissue for microscopial examination, staining methods.	23
Quality Control	5
	120
Total Hours—Medical Laboratory Science II and III:	180

Table 9

ONC Medical Laboratory Science Course Syllabus

Subject Area	Approximate Hours
Nutrition in the Mammal—food, diet, digestive mechanisms including gastric secretion and gastric analysis, quantitative and qualitative examination of gastric juices.	9
Homeostatic Mechanisms in the Mammal—body fluids including cerebrospinal fluid, body fluid circulation, cellular functions of the blood, blood clotting and anticoagulants, hematological procedures, phagocytes and immunity, serological characteristics of the blood, blood transfusion procedures, renal physiology and electrolyte balance, urine, maintenance of stable body temperature, respiratory exchange and acid-base balance.	51
Coordination of Physiological Activity in a Mammal—relationship of endocrine system to control of metabolic processes, reproduction, water and electrolyte balance, nerve impulse and the nervous system.	12
Microbiology—micro-organism in disease, food spoilage, industrial processes, immunity, antibiosis and chemotherapy, special emphasis on bacteria, culture media, sterilization, staining techniques, microscopial procedures.	48
	120*

*Approximately 60 of the 120 hours must be spent in laboratory demonstration and/or practica.

Higher National Certificate Programs

In order to be registered by the Council for Professions Supplementary to Medicine (CPSM), a person must have completed, as the minimum requirement, a Higher National Certificate (HNC), with the requisite laboratory component certified (see Table 1).

Entry Requirements. The general requirements for admission into an HNC program is either an ONC/OND, a TEC Certificate, or applicable GCE A levels. As is true for entry into the lower-level programs, exceptions based on experience or alternative qualifications may be substituted for the stated requirements.

Program Form. As is true with the ONC/TEC (lower) programs, students are full-time laboratory employees while enrolled part-time in the HNC course. The courses are day-release, one day and one evening a week for two years. Each year of the two-year program is divided into three 11-week

terms or, on occasion, arranged on a block-release basis. A sample program in Table 10 illustrates one possible distribution of hours and subjects. However, no two programs are identical; the only common requirement is that the material taught must meet the requirements of the CPSM and the IMLS through the Joint Committee.

Table 10

HNC Sample Program—Study Area by Hours*

Study Area	Instructional Hours†
Medical Laboratory Sciences	336
Elective Subject (MLS Specialty)	204
Complementary & Contrasting Studies	80
	620

*See Appendix B for a detailed sample syllabus.
†Approximately 390 hours—drawn from the 540 hours of medical laboratory science and elective subjects—is laboratory-based work.

The subjects to be included in all college HNC training programs were specified by the Department of Health and Social Security (DHSS) in 1974. They represent minimum course requirements for each specialty. Students must be familiar with the subject matter in all areas. In addition, they study one of these in greater detail as a specialty.

In recognition of the fact that students entering the HNC program with GCE A levels have less laboratory experience than those entering with the ONC/TEC (lower), the DHSS has indicated that the required laboratory employment must take this difference into account when structuring that part of the program for those students. (Appendix D notes the DHSS's requirements for college laboratory facilities dealing with medical laboratory science.)

HNC subjects, and a description of the coursework required by DHSS, are listed below:

Clinical Chemistry: laboratory administration, instrumentation, qualitative tests, ultramicro analyses, automated analyses, renal function tests, gastric and pancreatic functions tests, liver function, enzymes, protein analysis, lipid analysis, pigments, electrolytes and acid base status, chromotography, endocrine, common poisons, radioisotope techniques.

Hematology and Serology: laboratory administration, microscopy, automation and mechanization, hemoglobenometry, cytology, physical assessment, tests of hemostatic mechanisms, hemolysis, microbiological assay,

electrophoresis, radioisotope techniques, immunohematology, blood group serology and blood transfusion.

Histopathology and Cytology: laboratory administration, storage, laboratory application of microscopy, histology, fixation, processing, microtomy, staining, recognition of artifacts, exfoliate cytology, photomicrography, museum methods.

Medical Microbiology: laboratory administration, microscopy, culture media, enumeration of bacteria, isolation and identification of pathogenic bacteria and fungi, public health bacteriology, serology, chemotherapeutic agents, sterilization and disinfection, virology, laboratory animals.

Grading and Examinations. Grades are given on a continuing basis, experiment by experiment, for practical work. The criteria for practicum grading are practical technique, results obtained, discussion of results and comments, presentation of reports. Each year students must submit a project and pass an internal examination. The project will be in the elective subject. The examination scheme is shown in Table 11.

Table 11

Examination Scheme for Higher National Certificate in Medical Laboratory Subjects

Subject Area	Type of Examination
First Year:	
Medical Laboratory Science	2 written exams, 3 hours each. 1 practical exam, at least 4 hours.
Elective Subject	1 written exam, 3 hours. 1 practical exam, 4 hours.
Second Year:	
Medical Laboratory Science	2 written exams, 3 hours each. 1 practical exam, at least 4 hours.
Elective Subject	1 written exam, 3 hours. 1 practical exam, 4-8 hours (exact length of exam depends upon subject chosen and topic of experiment).

Higher National Diploma Programs

Because very few students opt for the longer HND program, only a brief comparison between HND and HNC programs will be made.

The basic difference in intent between these two programs was stated in a Department of Education and Science memorandum dated August 10, 1971 (DES reference: FECL 13/71 T1026/011). The HND ". . . may be regarded as

reaching a standard above that of the Higher National Certificate, by allowing sufficient time to enable the student to study under better conditions, to extend his basis of science and mathematics, and to coordinate and apply his knowledge, possibly through suitable project work." The two programs are compared in Table 12.

Table 12

Comparison of HNC and HND Programs in Medical Laboratory Subjects*

Program Element:	Higher National Certificate	Higher National Diploma
Program Hrs. (approximate):	600	1,800
Program Form:	Day-release or block release	Sandwich
Length of Program:	2 years	3 years
Subject Areas (with minimum hours):	Medical lab sci. (300 hrs.) Specialty (180 hrs.) Complementary or contrastive studies (120 hrs.)	Medical lab. sci. (600 hrs.) Specialty (300 hrs.) General studies (270 hrs.) Math, physical sci., biological sci., private study & tutorial (630 hrs.)

*Note that the HNC and HND programs are considered to be at the same academic level.

In 1972, the DES held a series of consultations to determine the need for HND in addition to HNC programs, and noted (its memorandum dated July 31, 1972, reference: FEC1 13/72 T1026/017), "These consultations have not produced a clear case for providing in this specialized field an HND course which would last longer and would be more expensive than the HNC currently being provided. . . ."

TEC (Higher) Certificate and Diploma Programs

As noted earlier in this chapter, currently the TEC (lower) program offers work comparable to that of the ONC program. However, TEC negotiations with the Institute of Medical Laboratory Science (IMLS) and the Medical Laboratory Technicians Board (MLTB) concerning TEC higher level certificates have resulted in rumblings of discontent within the IMLS, based mostly on the "relinquishment of a measure of the control the profession exercised over the medical laboratory sciences qualifications through the Joint Committee for Higher National Certificate and Diploma in Medical Laboratory Subjects" (reprinted from *The Gazette*, a periodical of the IMLS).

The IMLS feels that the "open admissions" philosophy of the TEC will produce Medical Laboratory Scientific Officers whose academic programs would not be sufficiently rigorous to produce professionals of a high enough standard. The IMLS is loathe to accept the TEC principle which states that

"a student should not be denied the opportunity of studying for a TEC award if there is a reasonable chance that he will be successful, bearing in mind that he will not be required by the Council to complete his program in a fixed period of time, and that units which have not been passed can usually be re-taken individually" (TEC Paper PC/3/75). With respect to criteria for students to pass courses, a TEC Policy Statement in 1974 indicates that hard work in courses (rather than objective success) should be a major consideration.

To what extent this difference in philosophy has an effect on the rigor of coursework still needs to be established. In theory, at least, entry criteria for TEC higher level certificates will be at the same level as those required for the HNC, and the academic level of coursework is expected to be comparable to that of the HNC.

A discussion of the proposed TEC (higher) Certificate qualifications is included here to forewarn the reader that the program will exist with several options and will carry the same weight with the professional bodies as does the current HNC. Note that, although the lower level programs require level I, II, and III units, the higher programs will require the majority of units to be at levels IV and V.

Like the TEC (lower) Certificate programs, the TEC higher level certificate programs will contain units of 60 hours each. The proposed certificate programs contain 10 to 14 units (600 to 840 hours) in a day-release scheme. During this entire period, the student must be employed in a laboratory. However, unlike the laboratory component at the TEC (lower)/ONC level, the CPSM has stated specific requirements and standards for all laboratory employment performed as part of the academic program. Some proposed TEC (higher) Certificate programs are shown in Tables 13-15.

Table 13

Proposed TEC (Higher) Certificate Program in Medical Laboratory Science, Laboratory Option

Subject Areas	No. Units	Hours
Environmental Laboratory	1	60
Cell Physiology and Biochemistry	2	120
Higher Vertebrate Physiology	2	120
Genetics or Bio-Instrumentation	1	60
Control Biology	2	120
Specialist Subject (selected from Hematology/ Serology, Histopathology, Medical Microbiology, Clinical Bio-Chemistry)	2-4	120-240
	10-12	600-720

As with the HND, the TEC (higher) Diploma program will not attract a large number of students. The 18 to 25 units (1,080-1,800 hours) will have a full-time sandwich form. A proposed program is shown in Table 16.

See Appendix E for a more detailed description of the proposed units outlined in Tables 13 through 16. Table 17 presents the parameters for the use of different unit levels as they apply to higher level TEC programs.

Table 14

Proposed TEC (Higher) Certificate Program in Medical Laboratory Science, Clinical Option

Subject Area	No. Units	Hours
Cell Physiology and Biochemistry	2	120
Higher Vertebrate Physiology	2	120
Physical Biology	2	120
Bio-Instrumentation	2	120
Quantitative Principles	2	120
Specialist Subject (selected from Hematology/ Serology, Histopathology, Medical Microbiology, Clinical Biochemistry)	2-4	120-240
	12-14	720-840

Table 15

Proposed TEC (Higher) Certificate Program in Medical Laboratory Science, Physiological Measurement and Radiology Technology Option

Subject Area	No. Units	Hours
Physical Biology	2	120
Cell Physiology and Biochemistry	1	60
Higher Vertebrate Physiology	2	120
Bio-Instrumentation	2	120
Control Biology or Higher Quantitative Methods	1	60
Specialist Subject (selected from Physiological Measurement, Radiation Technology, Electronics)	2-3	120-180
	10-11	600-660

Table 16

Proposed TEC (Higher) Diploma Program in Medical Laboratory Science

Subject Area	No. Units	Hours
Environmental Laboratory	2	120
Cell Physiology and Biochemistry	2	120
Higher Vertebrate Physiology	2	120
Genetics	1	60
Physical Biology	2	120
Bio-instrumentation	2	120
Control Biology	2	120
Quantitative Principles	2	120
Specialist Subject (selected from Hematology/ Serology, Histopathology, Medical Microbiology, Clinical Biochemistry, Physiological Measurement, Radiation Technology)	3-6	180-360
	18-21	1,080-1,260

Table 17

TEC Higher Level Programs in Medical Laboratory Science Unit Distribution By Level*

Level	Higher Certificate	Higher Diploma
II & III (maximum permitted in program)	3	6
IV & V (minimum required for program)	5	8

*These numbers are based on the minimum number of units in a TEC (higher) program. As the number of units increases, so will these numbers. What is important is that this ratio between the two categories be approximately maintained.

Post-Registration Qualifications

In order to be registered as a Medical Laboratory Scientific Officer by the Medical Laboratory Technicians Board (MLTB), one must complete a training program leading to an HNC or HND (and, in the future, a TEC higher level certificate or diploma) along with the appropriate laboratory component. Beyond this registration level, two further, and basically unrelated, educational programs exist—the Institute of Medical Laboratory Science (IMLS) fellowship and the IMLS Certificate in Medical Laboratory Management.

IMLS Fellowship. Fellowship in the IMLS is required for promotion to

senior grades in the National Health Service. Historically, the following have been the three means of qualifying for fellowship:

—Special Examination
—Thesis
—Diploma in Medical Technology.[7]

Special Examination

The most common way of obtaining a fellowship is by taking the IMLS special examination.[8] In the past (and at least until this year), students could prepare for the examination in the most convenient method available (private studies, attendance in courses, etc.). Now, however, official courses are offered, usually in a block-release scheme. Eventually, attendance in a course will be mandatory. The final course grade consists of 70% for the written exam, 20% for the course project, and 10% for coursework. The exam consists of four parts: Parts I and II may be considered "think papers," the first requiring opinions and the second dealing more factually with an academic problem; Part III deals with the more practical aspect of the field; Part IV consists of eight multiple choice questions. Appendix F presents more detailed information about this examination, using the field of Bacteriology as an example.

Thesis

The exam outlined above is given only in Britain, not overseas. For the large number of applicants who reside in other countries, the IMLS permits fellowship by thesis as an option to the special examination. The thesis should not exceed 20,000 words. The paper is either passed, failed, or referred and reconsidered if partial revision is possible. The IMLS also reserves the right to call the author for an oral examination. (Appendix B presents sample theses topics.)

It also seems that the profession is trying to attract the best qualified persons available into the field, including those who already hold degrees in science. One argument put forward in favor of attracting degree-holders is that GCE O-level holders—and, especially CSE holders—are not as well educated as were persons with those same credentials 15 years ago; the profession needs therefore to attract persons with degrees to keep the intellectual calibre high. Of course, attracting students with degrees into the field is not the same thing as offering a degree program in the field itself. If enough degree-holders do enter the field, the need for degree programs in MLS may be less pressing.

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7. The diploma program has not been given since 1976 and was officially discontinued in 1978. It is most unlikely that this qualification will be seen in the United States since, during the years immediately prior to 1976, very few candidates qualified for fellowship through this means.

8. See Appendix G for a list of institutions offering courses for the special exam.

Certificate in Medical Laboratory Management. In addition to fellowship qualifications, the IMLS grants the Certificate in Medical Laboratory Management to those who have passed an approved course of study covering at least 270 hours over a two-year period. The general subject areas covered by the program are Labor Relations, Legal Aspects, Management Techniques, Organisational Sociology, Principles and Practices of Management, Social Psychology, Structure and Finance of the Health Services. Assessment takes the form of two written examinations of three hours each, and a project resulting in a report of between 3,000 and 6,000 words. The coursework is offered at Paddington College, Bristol Polytechnic, W. R. Tuson College, and the City of Belfast College of Technology. Appendix H presents a more detailed view of this program.

Degree Programs/Admission Into U.S. Graduate Programs

Currently there are two bachelor's degree programs in medical laboratory science: a four-year sandwich program in medical sciences at Bradford University, and a joint honours degree in physiology and medical laboratory sciences at Portsmouth Polytechnic. There is much discussion within the profession concerning the advisability of degree programs. Arguments are put forth in favor of degree programs as a place for medical laboratory scientific officers to go after they complete basic training—a value in itself. More realistically, there appears to be a need to offer a superior academic qualification (the B.Sc.) for those studying for fellowship. Although not a degree, but a level of recognition in the field, fellowship training is being characterized as being at "degree level."

The question arises as to whether persons holding professional and academic qualifications eventuating in IMLS fellowship are eligible for admission to U.S. graduate programs. First, it must be recognized that the receipt of fellowship is not identical to the completion of a U.K. degree program in any formal sense. What is being claimed, especially by the IMLS, is that in terms of admission into either U.K. or U.S. graduate programs in relevant fields, there would be nothing to gain by placement in an undergraduate program. In response to inquiries made by the IMLS, several chartered U.K. universities noted that they would consider IMLS fellows for admission to postgraduate courses (e.g., master's degree or postgraduate diploma or certificate programs). The University of London noted that "a candidate who has obtained qualifications by written examination of an approved standard and whose general education, scholarship and training can be regarded as suitable preparation. . ." would be considered for postgraduate admission to appropriate fields. The University of Strathclyde indicated that ". . . the Fellowship obtained by examination (should) be deemed equivalent to a pass degree of a British university for the purpose of admission to higher degree study." The Council for National Academic

Awards (CNAA),[9] while not articulating a policy, has approved several Fellows for admission to postgraduate study.

The Laboratory Component in Medical Laboratory Science

All medical laboratory science programs provide laboratory training as part of the academic experience. However, the laboratory work is devised to be part of an overall, full-time, experience. The ONC, TEC, and HNC programs require concurrent laboratory work as a corequisite with the school-based program. Those entering the field with other qualifications (see Table 18), where training has not been approached in this manner, must arrange to make up the laboratory deficiencies.

The Medical Laboratory Technicians Board (MLTB) of the Council for Professions Supplementary to Medicine (CPSM), which has the responsibility for registration (the professional entry level) of medical laboratory scientific officers, requires a minimum of three years of acceptable in-service laboratory work, in addition to the laboratory component of the college-based program. The key word is "acceptable"; one cannot add up the years of full-time laboratory work and assume that the requirements have been met. Table 18 indicates the additional laboratory requirement for the various paths to registration. "Additional" here means beyond the required concurrent employment in a laboratory.

Table 18

Additional Laboratory Experience for the Various Paths to MLTB Registration

Academic Path to Registration	Additional Laboratory Requirement
ONC → HNC	none
TEC → HNC	none
GCE "A" levels → HNC	1 year
B.Sc. (in appropriate science field)	1 year

There is no direct control over the laboratory employment which runs concurrently with the ONC/TEC programs. However, the IMLS has suggestions which are reprinted in Appendix I.

With respect to HNC programs and training for those who enter the field with GCE "A" levels (including the bridging plan discussed below) or a degree—those for whom an additional year of laboratory work is required—the MLTB has stated particular requirements which are printed in full in Appendix J. Briefly, the key points are the following:

- Laboratories, in order to be approved, must meet the physical facilities criteria set by the Board.
- The laboratory work must be complementary to the academic program.

9. The CNAA is described in Chapter One, "Up-Front Glossary."

- Students/employees should be rotated among the various areas so that they may get the widest experience. (This requirement is hard to fulfill as many smaller laboratories do not have facilities in all areas.)
- Laboratory work must be geared to fill in deficiencies for those who enter training programs from programs other than the ONC/TEC. For example, someone who has a degree in biochemistry should concentrate on another laboratory area, because work in biochemistry is unnecessary. Also, those entering an HNC program with A levels obviously have less laboratory experience than do those entering with an ONC/TEC. Therefore, it is necessary to provide them with an "induction course"—an introduction to bring their training up to the level of that of the ONC/TEC holder. At times the gap is bridged by allowing the holder of GCE Advanced-level certificates to serve as a Junior Medical Laboratory Scientific Officer "A" prior to beginning the HNC course.

The Training of Persons from Other Countries

The Medical Laboratory Technicians Board (MLTB) has established a list of foreign countries and the credentials they offer which will qualify a person for registration as a Medical Laboratory Scientific Officer (MLSO). This list appears in Appendix K. Applicants from countries that are not on the list must be considered individually and then notified of where they place within the British system.

Because there are many applicants for registration from the listed countries, the Institute of Medical Laboratory Science (IMLS) has formalized the process for those persons to obtain associateship (see Table 1). Such applicants must 1) pass, as external candidates, the theory examinations taken by HNC candidates; and 2) have had not less than one year's experience in medical laboratories in the United Kingdom or the Republic of Ireland.

There is an International Association of Medical Laboratory Technologists (IAMLT) with headquarters in London. The Association's purpose is the exchange of information about the field. Membership in one of the member societies of the IAMLT does not ensure eligibility for state registration. The countries which belong to the Association are listed in Appendix L.

Former Programs in Medical Laboratory Science

During the 1960s the current programs of study, discussed in the preceding pages, replaced existing programs; in 1966 the Ordinary National Certificate replaced the Intermediate Examination, and in 1968 the Higher National Certificate superseded the Final Examination. The reason for the change was that students prepared for the examination by taking only the courses necessary to provide them with sufficient knowledge, both theoretical and practical, to pass the examination. As any combination of coursework and practical experience might provide the required information, there was no "program" which needed to be completed. The change to the ONC and HNC schemes provided the profession with set programs and a uniform system of courses.

The Intermediate Examination. In order to sit for this examination, students needed GCE Ordinary-level passes in English and mathematics and had to have reached an equivalent standard in biology, chemistry and physics, as well as to have an elementary knowledge of physiology. In addition, a basic knowledge of laboratory skills in bacteriology, blood transfusion, chemical pathology, hematology and histopathology must have been attained. See Appendix M for the examination syllabus. Those who were successful on this test became eligible for Ordinary membership in the IMLS. This level of membership was abolished on October 1, 1979.

The Final Examination. Those who held Ordinary membership were eligible to sit for the Final Examination, success on which led to Associate Membership in the IMLS—as does the HNC currently. Preparation for the exam was possible through attendance at part-time courses. Appendix N provides information on the examination scheme and a detailed syllabus.

Guidelines to Accompany Recommendations

Guide to Credentials. Members of professional associations are usually able to submit original certificates of membership, e.g., Membership in the Institute of Medical Laboratory Science. If a candidate for admission is unable to provide a credential, verification can be obtained by contacting the appropriate professional association directly. Also, although transcripts as known in the United States are not readily available from institutions in the United Kingdom, professional associations can provide information on syllabus content and on the candidate's performance on membership examinations. However, information concerning the actual course content and specific contact hours for the various parts of the approved syllabus as it is taught at a particular institution can only be obtained from the Director of that training program. It is strongly suggested that as much detailed information as possible be obtained about a particular program before decisions are made concerning placement because of the wide variance in course content and contact hours among the various programs in the same field. It might also be appropriate to request candidates to submit documentation of all other postsecondary, as well as all secondary, study before being placed in or even being admitted to a U.S. institution.

For information concerning credentials from other types of institutions (e.g., polytechnics, colleges of education, external examining bodies), refer to *United Kingdom*.[10]

Syllabus Content and Scope. Although the level of U.S. postsecondary introductory courses in the sciences varies, it is unlikely that these medical laboratory science courses, the scope of which is much narrower, will approximate U.S. introductory courses. Therefore, any syllabus needs to be

10. Fisher, p. 217.

reviewed in depth before the applicability of British training to any U.S. program is determined.

It is possible that an individual college's syllabus in MLS may differ from the syllabuses published by the professional agencies. For this reason, admissions officers should study the syllabus carefully, basing the decision on transfer credit upon the content of the syllabus, as well as upon the placement recommendations which are offered only as a guide for granting credit.

Laboratory Credit. A substantial amount of time is spent in laboratory work; therefore, the hours noted in the tables in this chapter should not be treated as recitation/lecture hours when determining advanced standing credit. Each hour of laboratory or demonstration may be counted as ⅓ semester hour. If a course consists of 120 hours (60 hours of lecture and recitation and 60 hours of demonstration and laboratory work), the semester hour equivalence is established by dividing the 60 hours of lecture and recitation by 15—to establish the semester hours—and by dividing the 60 hours of practica by 45 (one-third the value of the semester hour for each hour of practicum). Thus, it would be calculated as follows:

lecture and recitation	60/15 = 4 semester hours;
practica	60/45 = 1 semester hour.

Therefore, a course of 120 hours, half of which is practica, would be worth 5 semester hours.

Other Considerations. No transfer credit is recommended for English and General Studies at the ONC/TEC (lower) level as these subjects clearly are meant to provide those whose previous education was primarily technical with an opportunity to reach O-level standard in the humanities and social studies. All passing grades should be considered equivalent to a U.S. grade of C because academic standards are fairly rigorous.

Placement Recommendations

The placement recommendations were approved by the National Council on the Evaluation of Foreign Educational Credentials, August 8, 1979. For an explanation of the role of the Council, and a list of Council members, see pp. 181-182.

A. Pre-Registration Qualifications (ONC, TEC Lower Certificates)

1. Ordinary National Certificate (Variant in Medical Laboratory Science; see pp. 7-9, 15): Certificate-holders may be considered for undergraduate admission with up to 21 semester hours of transfer credit for courses in science and technology. The recommendation is based on the syllabus used as an example in the text (Table 3). Syllabuses with slightly different programs will, of course, require changes in the number and distribution of credits recommended for transfer as noted in the Guidelines preceding the placement recommendations.
2. Technician Education Council—Lower Level Certificate in Medical Laboratory Science (pp. 7-14): Certificate-holders may be considered for

undergraduate admission with up to 23 semester hours of transfer credit in science and technology. The semester hours recommended are based on the syllabus in the text (Table 2). Syllabuses with slightly different programs will, of course, require changes in the number and distribution of credits recommended for transfer as noted in the Guidelines preceding this section. In the event a person has only partially completed a program, transfer credit may be granted for TEC II and III level courses passed.

3. In-Service Laboratory Work—Full-Time Employment (p. 8): As the MLTB does not set down specific requirements for in-service work at this level, no academic credit is recommended.

B. Registration-Level Programs*

1. Higher National Certificate (pp. 15-18): Certificate-holders may be considered for up to 24 semester hours of transfer credit based on this program. This recommendation is based on the syllabus in Appendix C. Syllabuses with slightly different programs will require changes in the number and distribution of credits recommended for transfer as noted in the Guidelines preceding this section. If institutional policy permits, additional transfer credit may be granted for the in-service laboratory work which is a required part of this program.
2. Technician Education Council—Higher Level Certificate in Medical Laboratory Science—all options (pp. 18-21): Certificate-holders may be considered for transfer credit ranging from 27 to 37 semester hours based on this program. This recommendation is also based upon the supposition that the proposed program, as outlined in the text, will be adopted in toto. In the event a person has only partially completed a program, transfer credit may be granted for TEC III, IV, and V level courses passed. This recommendation is based on the syllabuses in the text (Tables 13-15). Syllabuses with slightly different programs will require changes in the number and distribution of credit recommended for transfer as noted in the Guidelines preceding this section. If institutional policy permits, additional transfer credit may be granted for the in-service laboratory work which is a required part of this program.
3. Higher National Diploma (pp. 17-18): Diploma-holders may be considered for up to 79 semester hours of transfer credit based on this program. This recommendation is based on the syllabus in the text (Table 12). Syllabuses with slightly different programs will require changes in the number and distribution of credits recommended for transfer as noted in the Guidelines preceding this section. If institutional policy permits, additional transfer credit may be granted for the in-service laboratory work which is a required part of this program.

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*The transfer credits recommended represent the value of each of the certificates named in this section; such credit would be in addition to any credit awarded for prior qualifications.

4. Technician Education Council—Higher Level Diploma in Medical Laboratory Science (pp. 20-21): Diploma-holders may be considered for transfer credit ranging from 43-51 semester hours based on this program. This recommendation is also based upon the supposition that the proposed program, as outlined in Table 16, will be adopted in toto. In the event a person has only partially completed a program, transfer credit may be granted for TEC III, IV, and V level courses passed. If institutional policy permits, additional transfer credit may be granted for the in-service laboratory work which is a required part of this program.

C. Post-Registration Qualifications

1. Institute of Medical Laboratory Science (IMLS) Fellowship by Thesis (p. 22): Holders of Fellowship by Thesis may be considered for up to 6 undergraduate semester hours of transfer credit based on this program of independent study.
2. IMLS Fellowship by Examination (p. 22): Holders of Fellowship by Examination may be considered for undergraduate transfer credit ranging from 6 to 12 semester hours based on this program. The amount of credit should be based upon a review of the examination syllabus for that special subject. These syllabuses are available from the IMLS.*
3. IMLS Certificate in Medical Laboratory Management (p. 23): Certificate-holders may be considered for approximately 18 semester hours of upper-division undergraduate transfer credit based on this program.

D. Admission to U.S. Postgraduate Study (pp. 23-24)

Those who have obtained IMLS fellowship may be considered for admission to an appropriate U.S. graduate program. Decisions should be made after careful review of the substance of the basis for fellowship—either the special examination or the thesis—and the substance of all postsecondary education. As no claim is being made that this level of education has equality with a U.S. bachelor's degree program, such graduate admission might be limited to those U.S. institutions which will waive the requirement for the degree. In states which require the bachelor's degree for licensing, applicants without a degree should be forewarned that although they have been deemed eligible for admission into a graduate program, they may not meet the state's requirement for licensure.

E. Bachelor's Degree Programs (p. 23)

1. Those who complete less than a full bachelor's degree program may be considered for undergraduate admission with transfer credit determined on a course-by-course basis.
2. Holders of bachelor's degrees may be considered for graduate admission.

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*Institute of Medical Laboratory Science, 12 Queen Anne Street, London W1M OAU.

Appendix A

Institutions Offering Approved Programs In Medical Laboratory Science*

Institution	ONC	TEC	HNC
Aberdeen Technical College, Aberdeen	d		
Barking College of Technology, Romford		d	
Brighton Polytechnic, Brighton			d
Brighton Technical College, Brighton	d	d	
Bristol Polytechnic, Bristol			b/d
Bromley College of Technology, Bromley	d	d	d
Brooklands Technical College, Weybridge	d	d	
Brunel Technical College, Bristol	b/d	b/d	
Buckinghamshire College of Higher Education, High Wycombe	d	d	
Cambridgeshire College of Arts and Technology, Cambridge	d		b
Carmarthen Technical and Agricultural College, Carmarthen		d	
Charles Keene College of Further Education, Leicester	d		
Chelmsford College of Further Education, Chelmsford	d	d	d
City of Belfast College of Technology	b		
City of Birmingham Polytechnic			d
City of London Polytechnic			d
Derby Lonsdale College of Higher Education, Derby		d	
Dublin College of Technology	b†		d‡
Dundee College of Technology, Dundee			d
Durham New College, Durham	d		
East Ham College of Technology, London	d	d	
East Hertfordshire College, Broxbourne	d	d	
Exeter College, Exeter	d		d
Farnborough College of Technology, Farnborough	d	d	

*Day release scheme—d; block release scheme—b.
†Irish Certificate in Medical Laboratory Science.
‡Irish Diploma in Medical Laboratory Science.

Institution	ONC	TEC	HNC
Galway College of Technology, Galway	b†		
Glasgow College of Technology, Glasgow			d
Gloucester City College of Technology	d	d	
Grimsby College of Technology, Grimsby	d	d	
Guilford County College of Technology, Guilford	d	d	
Gwynedd Technical College, Bangor	d	d	
Harrow College of Higher Education	d	d	d
Hounslow Borough College, Isleworth		d	
Hull College of Higher Education, Hull			d
Inverness Technical College, Inverness	d		
Kingsway Technical College, Dundee	d		
Kettering Technical College, Kettering	d		
Kitson College of Technology	d		
Lanchester Polytechnic, Coventry			b
Leeds Polytechnic, Leeds			d
Leicester Polytechnic			b
Liverpool Polytechnic			b/d
Longadale College of Further Education, Middlesbrough	d		
Luton College of Higher Education, Luton	d	d	d
Manchester Polytechnic, Manchester			d
Matthew Boulton Technical College, Birmingham	d		
Moston College of Further Education, Manchester	d		
Napier College of Commerce and Technology, Edinburgh			b
Neath Technical College, Neath			d
Newcastle-under-Lyme, College of Further Education, Newcastle-under-Lyme	d		
Newcastle-upon-Tyne College of Arts and Technology, Newcastle-upon-Tyne	d		
Newcastle-upon-Tyne Polytechnic, Newcastle-upon-Tyne			d
North East Liverpool Technical College, Liverpool	b/d	b/d	
North East Surrey College of Technology, Epsom	d	d	d
North Staffordshire Polytechnic, Stoke-on-Trent			d
Oxford College of Further Education, Oxford	d		
Oxford Polytechnic, Oxford			d
Paddington College, London	d		d
People's College of Further Education, Nottingham	d	d	
Petersborough Technical College, Petersborough	d		
Portsmouth Polytechnic, Portsmouth			d

†Irish Certificate in Medical Laboratory Science.

Institution	ONC	TEC	HNC
Preston Polytechnic, Preston			d
Reading College of Technology, Reading	d		
Richmond College of Further Education, Sheffield	d	d	
Robert Gordon's Institute of Technology, Aberdeen			d
Salisbury College of Technology, Salisbury		d	
Salford College of Technology, Salford	d		
Sheffield City Polytechnic, Sheffield			d
Southampton College of Higher Education, Southampton	d		
South Glamorgan Institute of Higher Education, Cardiff		d	d
South London College, London	d	d	
Stevenson College of Further Education, Edinburgh	d		
Stow College, Glasgow	d		
Tottenham College of Technology, London	d	d	
Trent Polytechnic, Nottingham			d
Ulster College, The Northern Ireland Polytechnic, Newtonabbey			b
W. R. Tuson College, Preston	d		
Wigan College of Technology, Wigan	d		
Wolverhampton Polytechnic, Wolverhampton			d
Wulfrun College of Further Education, Wolverhampton	d		

Appendix B

Titles of Theses for Fellowship

1968

Bacteriology

The extraction of mycological antigens and their use in serological techniques as an aid in the diagnosis of bronchial disorders caused by fungi.

A new selective medium containing basic fuchsin, nalidixic acid and phenylmercury chloride for the isolation of *Staphylococcus aureus*.

The taxonomy of the genus *Pasteurella*.

Chemical Pathology

The vitamin B_{12} binding capacity of transcobalamin I and II of normal human serum.

The estimation of testosterone in human peripheral plasma.

Modifications to the enzyme-spectrophotometric methods of measuring urinary formiminoglutamic and urocanic acid and their application in comparative studies on subjects with a variety of clinical conditions.

The application of gas-liquid chromatography to the estimation of steroids in human pregnancy urine.

Automated fluorimetric determination of 1.1.1. oxidoreductases.

The determination of urinary-17-ketosteroid glucuronides and sulphates by gas-liquid chromatography.

The application of atomic absorption spectrophotometry to clinical chemistry.

The measurement of viscosity of human blood, plasma and serum.

Histopathology

Electron histochemistry of normal dystrophic muscle.

Histological methods for peripheral nerves.

The distinguishing of different tissue components by dyeing.

Parasitology

Studies on the serological methods for the diagnosis of human trypanosomiasis in East Africa.

1969

Bacteriology

Deoxyribonucleases and hyaluronidases of the *Cl. septicum* and *Cl. chauvoei*.

Blood Transfusion

A study of the antibodies to the serum antigens that can be determined by agglutination-inhibition techniques.

Chemical Pathology

The use of automated fluorimetric techniques based on NAD and NADP linked enzyme systems in the study of intermediary carbohydrate metabolism.

Colorimetric assays of serum 2-hydroxybutyrate dehydrogenase.

Histopathology

Histochemical studies on phosphorylase and amylo 1, 4 → 1, 6 transglucosidase activity in the liver.

A comparison of the distribution of several enzymes in frozen or cryostat sections of nerves with that demonstrated in isolated nerve fibres.

Plastics as embedding media in oral histology.

Histological analysis of Corpus luteum function, as studied in the ferret.

1970

Bacteriology

The formation of M-antigen by Group A streptococci in culture.

A study of the epidemiology and bacteriology of the 'opportunist' (anonymous) mycobacteria, with special reference to *M. kansasii*.

Observations on the proteolytic activity of *Cl. tetani*.

Chemical Pathology

Method for the evaluation of the vitamin B_6 status in children with convulsions.

The distribution of proteins in cerebrospinal fluid by disc electrophoresis.

Ninhydrin-positive substances in human faeces.

Trehalase activity in human blood.

Haematology

Preparation and use of a new artificial system for Factor XI assay.

Histopathology

The effect of acid hydrolysis on sialomucins at selected epithelial sites.

The validity of histochemical lipid techniques.

Studies on the histochemical demonstration of glycogen.

Histology of the ovine pancreas.

Immuno-autoradiography for electron microscopy.

Virology

The application of antibody absorption techniques to the study of the immune response to the parainfluenza viruses.

1971

Bacteriology

Application of immunological methods to the investigation of *Escherichia coli* urinary infections.

Development of tests for biochemically inactive bacteria.

Chemical Pathology

The application of X-ray crystal analysis to the study of calculi.

Gas chromatographic analysis of biogenic amines.

The measurement and interpretation of liver zinc.

Histopathology

The effect of pH on alcian blue staining of sialomucin and sulphomucin at selected epithelial tissue sites.

Peroxidase-linked antibody for immuno-histochemical techniques.

1972

Bacteriology

A practical assessment of micromethods in bacteriology and their development and application to a routine laboratory procedure.

A study of coliform bacteria isolated from post-operative wounds.

Laboratory techniques for the investigation and control of silver nitrate prophylaxis in burns.

Chemical Pathology

Insulin secretion from the human insulin pancreas.

Androgenic steroids in human plasma.

Haematology

An *in vitro* study of the effect of dipyridamole in comparison with acetylsalicylic acid on human platelet aggregation.

An assay for the estimation of Factor IX (Christmas Factor).

A comparative study of 7S and 19S antibodies in rhesus haemolytic disease.

The measurement of fibrinogen and its derivatives in blood.

Histopathology

Some technical factors affecting the cytochemical localisation of alkaline phosphatase.

Studies of the staining of elastic tissue with special reference to the uterine blood vessels.

Parasitology

Ornithodorus moubata porcinus (Walton) (sensu van de Merwe). Observations on the distribution and ecology in animal burrows in East Africa and the role of this tick in the transmission of African swine fever virus.

Virology

Serological and biological characteristics of Hong Kong influenza virus.

1973

Bacteriology

Filamentous pyocines of *Pseudomonas aeruginosa*.

Some aspects of mycoplasma.

Brucellosis: laboratory methods which pertain to diagnosis in man and animals, especially cattle, north eastern region of Scotland.

Blood Transfusion

The laboratory evaluation of a technique for the long term storage of donor blood in liquid nitrogen.

Chemical Pathology

Equilibrium dialysis of drugs.

Fractionation of characterisation of peptic peptides from the Cg2 homology region of human IgG.

Analysis of plasma warfarin by gas chromatography.

Haematology

A study of graft-versus-host disease in relation to haemopoietic and lymphoid tissues.

Histopathology

Skin surface cytology using a membrane technique.

The innervation of the human muscle spindle.

Investigation of new staining methods for the macroscopic demonstration and differentiation of the lining epithelia of the larynx.

Virology

New problems associated with *Herpesvirus hominis*.

1974

Bacteriology

Technical factors influencing Salmonella surveillance.

Histochemical and bacteriological study of bovine dermatophilosis in Nigerian Bunaji cattle.

Laboratory studies of some fungi incriminated as opportunistic pathogens.

Chemical Pathology

The development and application of a competitive protein-binding assay for urinary free cortisol.

'Matrix substance A': serological properties and prospective immunoassay.

Haematology

A new method for the assay of haemoglobin F .

A study of human leukaemia cells for use in clinical immunotherapy.

Virology

Studies on the growth of colonies from haemopoietic cells *in vitro*.

1975

Bacteriology

The identification of elementary bodies of genital strains of *Chlamydia trachomatis* by electron microscopy of unsectioned preparations.

Blood Group Serology and Transfusion

The association of red cell membrane elasticity with Rh genotype.

Clinical Chemistry

Haptoglobin and total seromucoid concentration.

The measurement of hormone release from isolated rat tissue.

The design, development and evaluation of a multi-method cartridge AAII system.

Haematology

Anomalous Rhesus D typing during pregnancy.

The quantitative estimation of blood group active substance in association with gastro-intestinal carcinoma.

Parasitology

Developments in the indirect antibody fluorescent test for tropical parasitic infection, especially malaria.

Virology

Some characteristics of a sheep adenovirus isolate.

1976

Bacteriology

The ecology and biology of the gut flora with special reference to the carcinogenesis and colon cancer.

Investigation of oral fusobacterium.

Control of animal health in a modern experimental unit. Laboratory and microbiological investigations.

Serological studies and serotyping of *Bacteroides fragilis*.

Modified bacteriological swabs for the transport of anaerobes in clinical specimens.

Clinical Chemistry

An investigation of fat soluble phosphorus compounds in amniotic fluid.

The quantitative determination of bilirubin in amniotic fluid.

The study of immunoglobulin fragments in serum and urine.

Antisera to oestrone sulphate.

Haematology

Levels of sickle haemoglobin in the heterozygous sickler.

Chromosome analysis in mixed lymphocyte culture (MLC) reaction.

Histopathology

The quantitative measurement of acid phosphatase activity in normal and regenerating epithelium of the female hairless hamster.

Identification of human tumour cells in short term monolayer culture.

Morphometric and cell-counting techniques applied to duodenal mucosa.

Immunology

Production of specific antisera to mouse monoclonal immunoglobulins.

Storage of kidneys by perfusion techniques.

1977

Bacteriology

The isolation of anaerobes from blood.

The bacterial examination of upper intestinal aspirates.

A comparison of three methods for the transport of clinical specimens containing anaerobes.

Biological characteristics of *Chlamydia trachomatis*.

The role of refrigeration and chemotherapy on the detection of significant bacteriuria.

Blood Group Serology

The study of magnesium supplement to stored whole blood for the preservation of 2, 3-diphosphoglycerate in erythrocytes.

Clinical Chemistry

The development and assessment of a completely automated continuous flow radioimmunoassay system.

Cholinesterase inhibition studies using analgesic and hypnotic drugs.

The development of an *in vitro* assay system for use in structure-activity relationships aimed at determining the mode of action of histamine liberators (including anaphylactic antibodies).

Estimation of total glycosaminoglycans in amniotic fluid.

Haematology

Thrombus weight as a measure of the thrombus-enhancing effect of drugs in the rat.

Histopathology

Leishmania donovani—an electron microscopic study.

Immunohistochemical study of carcinoembryonic antigen by optical and electron microscopy.

Parasitology

Parasitaemia assessment in bovine babesiosis.

Appendix C

Detailed Sample Syllabus for the Higher National Certificate Course

1. Physical and Organic Chemistry Related to Biochemistry

Determination of the concentration of sucrose using refractometric and polarimetric techniques: determination of the specific rotation of sucrose. Total electrolyte content of serum using automatic freezing point osomometer.

Separation of a mixture of ethanol, methanol and methyl acetate using simple gas liquid chromatography. Separation of amino acids by chromatography. Estimation of separated amino acids. Quantitative estimation of glucose. Quantitative test for reducing sugars. Qualitative tests on glycerol and choline.

Determination of the partition coefficient of acetic acid between water and butanol. Effect of change of phase volume, with calculation of t test to determine if there is any real significance.

Conductivity. Selected conductimetric titrations, e.g., strong acid/strong base, weak acid/strong base, mixture of weak and strong acid/strong base, sodium sulphate/barium chloride.

pH. Determination using quinhydrone and glass electrodes, linearity of response of glass electrode. Potentiometric titration of strong and weak acids and polybasic acid.

Colorimetry. Colorimetric determination of Evan's Blue using a simple colorimeter with no monochromator, and an EEL Spectra.

Spectrophotometry. The use of manual and recording U.V. and visible spectrophotometers. Effect of instrumental settings, such as slit width, on the recorded spectra of benzene. Determination of the concentration of a simple compound absorbing in the U.V. which obeys the Beer-Lambert Law. Calculation of the molar absorptivity.

Emission Techniques. Determination of potassium and sodium ions in solution using flame photometry.

Infra-red Spectrophotometry. Wave number calibration using polystyrene, preparation of mulls, films and discs; assignment of simple absorption bands.

Fluorimetric Determination of Quinine. Determination of potassium iodide, utilising its quenching effect on quinine fluorescence.

Titrimetry. Correct use of apparatus (burette, pipette, balance) including measurement of semi-micro quantities. Sampling techniques. Calculations, including back titration—use of mechanical and electronic calculators. Corrections for impurities. Estimation of errors in determination.

Standardisation of solutions. Preparation and storage of standard solutions. Dilution techniques.

Standardisation of solutions against primary standards. Acid/alkali titrations.

Use of indicators. Formol titration; titration of aspirin. Kjeldahl determination on biological fluid. Complexiometric titration, e.g., Ca^{++}, Mg^{++} and alum by EDTA. Gravimetric determination on fatty acid and nickel. Ignition techniques.

Qualitative Analysis. Reactions of amino acids, carbohydrates compared with acids, amines, aldehydes and ketones. Resolution of optical isomers. Separation of mixtures and purification of components. Detection of radicals commonly met with in the analysis of body fluids.

Radiometric Techniques. Demonstrations of Geiger-Müller counters, scintillation counters, photographic and autoradiographic methods, automatic methods. Diffusion chamber demonstration. Decay of short lived nuclide using liquid G/M tube. Techniques for counting planchet sources. Voltage characteristics of G/M equipment and importance of dead time effects. Determination of paralysis time in G/M set. Kinetics of radioactive transformation, estimation of half-life, decay constant, and mean life. Determination of gamma half thickness. Determination of beta half thickness for ^{32}P. Determination of beta energy by external absorption.

2. Applied Biochemistry, Cell Physiology, and Molecular Biology

Extraction of DNA and RNA from bovine spleen, and record of absorption curves. Determination of DNA and RNA. Isolation and identification of DNA bases.

Recovery studies.

Phosphorous uptake as a function of glucose concentration using ^{32}P and saccharomyces.

Succinate dehydrogenase activity of isolated mitochondria.

Isolation of mitochondria and a study of the effects of various inhibitors on their activity.

Isolation and purification of an enzyme.

Determination of Michaelis constant, the effect of temperature, pH, substrate activity on an enzyme. Determination of Ki.

The induction of enzymes, and the effects of antibiotics.

Immunoelectrophoresis.

A quantitative study of aerobic and anaerobic respiration using *Esch. coli*.

The transport of amino acids and sugars across rat intestine.

An analysis of transamination activity.

Biochemical changes in brain tissue following behavioural changes.

Microscopy. Setting up and use of various systems of microscopy. Comparison of different systems.

Culture Techniques. Basic techniques for bacteria, fungi, tissues, and viruses.

Membrane Phenomena. Osmotic phenomena in red blood cells. Uptake and release of K^+, effect of temperature and cardiac glycosides.

Mutation. Mutagenic agents and rate of mutation. Fluctuation test. Development of resistance.

Tissue Fractions. Centrifugation of subcellular components, and their identification. Marker enzymes and their detection in fractions and sections.

Antibiotic Assay. Plate-diffusion methods.

Vitamin Assay. Plate and tube method.

Amino Acid Assay.

Statistical. Treatment of data from preceding exercises where possible. Poisson distribution of cells in slide counts and of colonies on plates. Coefficient of Variation of all counts. Assay results and limits of error. Test of significance on assay results from different samples. Use of electronic calculators.

3. Clinical Chemistry

The effect of various anticoagulants on blood constituents.

The effect of various protein precipitants on blood constituents.

Exercises in accuracy and precision using manual, work simplified and automated techniques. Statistical analysis of results including computer analysis.

Demonstration, review and practice in automated analysis including SMA12 and M300.

Comparative blood sugar and glucose methods.

General reactions of urine including clearance tests.

The identification of urinary reducing substances.

Identification and quantitation of digestive enzymes.

Tests of absorption.

The effects of different chromogens and reagent strength on FOB measurement.

Bilirubin and pigments.

Proteins by biuret and electrophoretic methods.

Enzyme methods including comparisons of kinetic and colorimetric methods.

LD and its isoenzymes. Alkaline phosphatases and its isoenzymes.

Effects of specific substrates and gel filtration.

Liver function tests. Haptoglobins.

Effects of stasis on calcium methods by atomic absorption.

Vitamin reactions and saturation tests.

Basal metabolism.

Determination of cholesterol and other lipids chemically and by TLC. β lipoproteins and NEFA.

Copper analysis by chemical and atomic absorption methods.

Iron and transferrin estimations.

Barbiturate estimation. Salicylates and amphetamines.

Determination of steroids, oestrogens, cortisols and other hormones by chemical, gas chromatography and radioimmunoassay methods.

Tests of acid-base status and electrolyte balance.

Investigation of CSF.

Investigations in congenital metabolic abnormalities.

4. Haematology and Serology

Collection of blood and use of anticoagulants. Red cell count. Total white cell count. Use of the Coulter counter.

Preparation of blood smears. Differential leucocyte counts. The use of the various Romanowsky stains. RBC inclusions. The polynuclear count. The examination of bone marrow smears. Cyto-chemical staining: the Feulgen nuclear reaction, the periodic-acid Schiff reaction for glycogen, the staining of lipids and phosphatases. Peroxidase staining and esterase demonstration.

Supravital staining of reticulocytes. Counter-staining. Enumeration of reticulocytes. The effect of drugs and haemorrhage on the reticulocyte count in animals.

Blood Coagulation. Screening tests: bleeding time, coagulation time, 1-stage prothrombin, and partial thromboplastin tests. Thromboplastin generation—Hicks-Pitney and TGT. Assay of coagulation factors. Fibrinogen/Fibrinolysis—Fibrinogen titre, Thrombin Time and E.A.C.A.

Test of platelet function—clot retraction, A.D.P. aggregation, platelet-factor 3 availability.

Estimation of haemoglobin, by colorimetric methods and spectrophotometric methods. Iron analysis. Oxygen capacity. Use of the 'reversions spectroscope.' Spectroscopic examination of haemoglobin derivatives. Determination of carboxy-haemoglobin in blood. Haemoglobinopathies and detection. Kleihauer technique. Haptoglobin methods.

The effects of various agents on the *in vitro* haemolysis of red blood cells. Osmotic fragility test. Estimation of bilirubin. Detection of methaemalbumin (Schumm's test).

Test used in haemolytic anaemias: acid serum haemolysis test, Donath-Landsteiner test.

Estimation of plasma volume using Evans' Blue, and ^{131}I albumin. Determination of red cell volume using ^{51}Cr.

Determination of packed cell volume using Wintrobe's method and a micro-method. Red cell sedimentation rates. Direct measurement of red cell diameters and statistical treatment of results.

Assay of vitamin B_{12}, folic acid and formiminoglutamic acid. Schilling's tests.

Comparison of results obtained for P.C.V. haemoglobin and plasma proteins, using the copper sulphate specific gravity method, with the values obtained by other methods. Calculation of M.C.H., M.C., H.C., M.C.V., etc. Automated methods.

Determination of ABO group using unknown cells and unknown sera by tube and slide methods. Anomalous results: rouleaux formation (pseudoagglutination), cold agglutination. Tests for Rh antigens and antibodies. Enzyme methods. Compatibility test. Titration of blood-grouping sera. Test for acidity of sera. Lectins. Preparation and standardization of anti-human globulin serum. Coombs' test and its derivatives. Identification of antibodies.

Differentiation of immune and non red cell stimulated antibodies. Aseptic techniques.

Blood transfusion administration and processing. Examination of blood for parasites. Methods of preparation and staining. Sheep-cell agglutination tests and related latex tests. LE cell methods. Chromosome analysis methods.

Detailed studies of abnormal cell types in blood and bone marrow preparations, cytochemistry of these cells.

The separation of foetal and adult haemoglobin by paper and cellulose acetate strip electrophoresis. The identification of abnormal haemoglobins.

Detection of foetal erythrocytes in the maternal circulation. Test for the sickling of red cells.

Investigation of red cell enzymes. Esterases. Specificity requirements of acetylcholinesterase. Carbonic anhydrase. Glucose-6-phosphate dehydrogenase.

5. Histopathology and Cytology

Histology. Recognition of tissues and cells, including epithelia, connective tissues, muscle and nerve cells. Organisation of tissues into organs including examination of the follow..ng systems: digestive, excretory, respiratory, reproductive, endocrine and nervous systems.

Fixation. Experiments to show the effect of fixatives on proteins. Experiments to show the rate of penetration of fixatives. Effects of fixatives on subsequent staining of tissues. Effects of formalin and alcohol fixation on the distribution and staining of glycogen.

Decalcification. The effects of decalcifying agents on subsequent staining of tissues. Determination of the end point of decalcification.

Processing. Effects of different processing methods on tissues, including manual and automatic techniques. Use of different embedding media including paraffin waxes, celloidin, gelatine, plastics and double embedding techniques. Use of microtomes including rocking, sledge, freezing microtomes and use of cryostat.

Staining. A broad selection of histological methods will be carried out to ensure that the student is familiar with representative methods for all the main tissue components.

Opportunity will be taken to show how variation in the methods affects the final results.

New or unusual methods will also be included at several points in the course and the student will be expected to evaluate them against established methods.

The following, or similar, methods will be used and others included as appropriate.

Nucleus and cytoplasm (including inclusions)	Haematoxylin and Eosin, Phloxine-tartrazine, Altman stain, Heidenhains haematoxylin, P.A.S., Bests Carmine, Aldehyde fuchsin.
Connective tissues and muscle (including fibrin)	Trichrome methods (Masson, Mallory), Van Gieson, Phosphotungstic acid haematoxylin, MSB, Gram-Weigert. Resorcinol fuchsin, Verhoeffs haematoxylin, acid orcein, silver methods for reticulin (Foots, Gordon & Sweet).
Pigments	Solubility tests (iodine-hypo, picric acid), Schmorls, Masson-Fontana silver, Prussian blue and Turnbulls blue reactions, Diazo technique, chromaffin reaction, bleaching.
Bacteria and fungi	Gram methods, P.A.S., Levaditi, Z.N., Machiavello, Gridleys method.
DNA and RNA	Feulgen, methyl green-pyronin, enzyme and chemical controls.
Lipids	Lysochrome methods, Nile blue sulphate, osmium tetroxide, Schultz. Extraction methods.
Enzymes	Succinic dehydrogenase (by nitro BT), Dopa oxidase, acid and alkaline phosphatases (Gomori and Burstone) cholinesterase. Use of controls.
Nervous system	Beilchowsky, thionin, Weigert-Pal, Busch, Andersons Victoria blue, Cafals gold sublimate, Hortega.

Exfoliative cytology	Papanicolaou, Shorrs method, cresyl fast violet, Guards stain.
Flourescent techniques	Acridine orange, fluorescent, Schiff, Auramine O, immuno-fluorescent methods.
Mucins	Alcian blue, P.A.S., Southgates muci-carmine. Metachromatic methods.
Amyloid	Congo red methods and dichroism, thioflavine. Metachromatic methods.

Mounting. Determination of refractive index of mounting media. Properties of mounting media (fluorescence, fading, shrinkage).

Microscopy. Use of transmitted light, dark ground, phase contrast, polarising and fluorescent microscopes. Photomicrography. Measurement methods, use of micrometers and graticules.

Demonstration of electron microscopy.

Miscellaneous techniques. Demonstration of chromosome preparations, autoradiography, micro-incineration and museum methods.

6. Medical Microbiology

Systematic Microbiology. A comprehensive study of the characteristics and the methods used in the examination of the micro-organisms of medical importance, including culture and microscopy for fungi and the recognition of protozoa and common intestinal parasites.

Serological Procedures. Exercises to demonstrate the nature of antigens and antibodies and their interaction. This will include the main serological tests of bacteriological interest.

Virological Techniques. Use of cell cultures and fertile eggs in the growth of virus. Isolation and identification, to include titration of virus, metabolic inhibition test and plaque formation. Demonstration of use of electron microscope. Virus serology.

Environmental Bacteriology. Bacterial content of air and its determination; the bactericidal effect of UV. Microbiology of water: comparison of media used in coliform counts. Confirmatory tests for *E. coli*, *Cl. welchii* and *Strep. faecalis*. Microbiology of milk: the relationship between viable count and methylene blue reduction times. Viable counts and diagnostic methods in food microbiology.

Quantitative Techniques. Practical work designed to encourage a critical approach and to show the applications of statistics to bacteriological measurements. Cell size measurement: comparison of methods available. Total counts: comparison of slide method and Coulter counter. Cell suspensions: comparison of nephelometry and spectrophotometry. Viable counts: comparison of colony count methods; colony counts and dilution methods; use of membrane filters. Use of calculating machines and relevant statistical calculations. Quality control of media and investigation of selective activity.

Antimicrobial Activity. Bactericidal activity and comparison of phenolic disinfectants. Kelsey-Sykes test and in-use test. Minimum inhibitory concentration determination of antibiotics. Spectrum of antibiotics, optimum conditions for antibiotic sensitivity tests, antagonism and synergism detection of penicillinase producers.

7. Complementary and Contrasting Studies

Approximately half the hours available for CCS will be spent on Contrasting Studies and the remainder of the time on Complementary topics.

The general aims of the scheme are:

(i) to improve the student's poise, self-confidence and powers of self-expression;

(ii) to increase the student's awareness of the world around him and particularly social relationships and social problems;

(iii) to introduce the student to ideas, activities and disciplines outside the fields of special study;

(iv) to stimulate existing interests and arouse new ones.

Contrasting Studies. Depending on the interests of the group, topics will be developed from the following themes:

The Changing World: Population, land, national resources, energy, conservation, labour and capital, communication in relation to modern nation-states, the distribution of political power.

Contemporary Social Problems: Race, delinquency, penal reform, teenagers, gambling, automation, drug abuse, leisure, education, factory life, the population explosion, housing and hire purchase, the changing family, mass media, the changing role of women.

Complementary Studies. Safety precautions and hazards: accidents, fire, acute and chronic poisoning, toxic vapours, radioactive compounds, carcinogens. Storage, handling and disposal of dangerous substances.

The care and management of laboratory animals.

The Health Service.

Medical nomenclature and terminology.

The I.M.L.S.

Scientific literature and the use of the library.

The social responsibilities of the scientist.

The pharmaceutical industry and the development of drugs.

Laboratory management and organisation. Administration.

All students will also follow a self-contained course in Computer Appreciation including the development and use of computers, computers in laboratory medicine and programme writing.

Appendix D

Department of Education and Science: Requirements for College Laboratories Dealing with Medical Laboratory Science

1. Medical Laboratory Science

In general, the level of provision suitable for HNC courses in Chemistry and/or Applied Biology is adequate for this work provided that space is available for additional students. Colleges offering more advanced, post-HNC courses in analytical chemistry, biochemistry, microbiology and physiology will have already many items of equipment suitable for this course. Particular consideration should be given to equipment which serves to elucidate working principles rather than to process a large number of samples.

Column, paper, thin layer and gas chromatographic apparatus. Apparatus for fraction collecting and to demonstrate principles of counter-current distribution. Dialyser.

Electrochemical apparatus, including conductometric, potentiometric titration assembly. Polarograph. Photometric titrator. pH meter. Special electrode systems for pH determination.

pO_2, pCO_2 electrode systems.

Apparatus for the analysis of blood and air gases, such as Haldane, Van Slyke, Lloyd, Scholander, apparatus for the collection of expired air.

UV, visible and, if possible, IR spectrophotometers. Refractometer. Polarimeter. Spectro-fluorimeter. Flame photometer. Reversion spectroscope. Nephelometer. Recording facilities on spectrophotometers and other apparatus would be advantageous.

Radio-nuclide counting equipment, including liquid scintillation counting.

Electrophoresis apparatus for paper, acetate, gels, including scanning apparatus.

Apparatus for the measurement of gaseous exchange in tissues, microorganisms and sub-cellular particles such as Warburg or Barcroft respirometers.

Tissue homogeniser. Centrifuge suitable for preparatory work on cells and sub-cellular particles.

Advanced microscopy assembly, including facilities for phase, interference, dark ground, UV and photomicrography. UV source.

Equipment for semi-micro and micro analysis.

Microtomes, freezing microtome, and cryostat if possible. Embedding equipment, including vacuum embedding.

2. Specialist Studies

The organization of the course normally will be such that the greater part of the specialist studies will be arranged in medical laboratories. In certain colleges the provision of internal facilities for this work may be justified but, in general, the periodic use of the medical laboratory is the most satisfactory way of arranging

the course. The standard of provision required is very similar to that for AIMLT courses and examples of the equipment needed include: advanced instrumentation for biochemistry; automated analysis systems; open and closed circuit metabolic rate apparatus; analytical centrifuge; tissue processing machines; staining machines; various types of microtomes, including the ultra-microtome; knife sharpening machines; cell counting machines.

3. Advanced

Instruction in aspects of very advanced techniques and their applications may be included appropriately and will usually take the form of arranged visits to specialist institutions where these are within reasonable travelling distance. Examples include: advanced methods in the application of radionuclide techniques; mass spectrometry; the ultra-centrifuge; electron microscopy; the large-scale culture of micro-organisms; semi-automated media production, the production of vaccines, toxins and toxoids; the production of antibiotics.

Appendix E

Brief Outline of the TEC Units for Higher Awards

Area 1. Environmental Studies (2 units):

Environmental, General (1 unit): the environment of technological man with particular reference to resource considerations, the effects of human technology on the environment, the health care industry.

Environmental, Laboratory (1 unit): physico-chemical and biological principles employed in the culture and maintenance of living organisms, isolated tissues, cells, and cellular products for laboratory purposes.

Area 2. Functional Anatomy and Morphology (6 units):

Human anatomy and morphology (2 units);

Plant anatomy and morphology (2 units);

General animal anatomy and morphology (2 units).

Area 3. Cell Biology (7 units):

Cell physiology and biochemistry (2 units);

Higher vertebrate physiology (2 units);

Plant physiology (2 units);

Genetics (1 unit).

Area 4. Biophysical Principles (6 units)—referring to physical principles which illustrate biological function or are employed to measure and describe living organisms and their environments, in three parts:

Physical biology (2 units): the physico-chemical nature of living matter and living processes with particular reference to analysis and measurement principles.

Bio-instrumentation (2 units): the scope and limitations of contemporary instrumentation methods. Physical principles employed.

Bio-mechanics (2 units): the mechanical features of posture and movement in the human subject. The engineering and biological features of prosthetic method.

Area 5. Human Biology (4 units)—selected topics in human biology relevant to the advanced technicians:

Control biology (2 units): the intentions, methods and consequences of human action to control and modify living organisms and the environment to support human society. The nature of control procedures, e.g., environment, population, nutrition, breeding, use of chemical substances, and radiation methods. The nature of disease in the human, and plant and animal populations kept by man. Principles used in the control of disease.

Psychology (2 units): human behavior as it relates to the needs of remedial medicine and allied caring professions.

Area 6. Quantitative Principles (2 units)—numerical analysis and statistical methods related to field observations, laboratory data and the design of experiments. Introduction to computing.

Appendix F

Study Guide for the Institute of Medical Laboratory Science (IMLS) Special Examination in Bacteriology

General Biomedical Sciences

Human Anatomy—review of basic human anatomy and physiology.

Biological Material—separation and fractionation of biological material.

Cell Physiology—cell structure, function and metabolism.

Genetics—general concepts of human genetics.

Immunobiology—outline of modern concepts.

Medical and Optical Physics—radiation physics and principles of microscopy.

Statistics—statistical analysis of biological data and basic principles of computer programming.

Microbial Anatomy, Physiology, and Metabolism

Structure and Function—review and detailed consideration of structure of microbial cell. Synthesis and function of cell walls. Cell membranes and membrane transport. Cellular reserve materials. Bacterial spores and appendages.

Nutrition—review of requirements for growth of micro-organisms.

Metabolism—energy metabolism. Electron transport, biosynthesis of carbohydrates, amino acids, lipids, nucleic acids and proteins. Pathways of biochemical synthesis.

Enzymes and Enzyme Kenetics—expansion of enzyme kinetics studied at HNC level. Mode of action of enzymes. Enzymes important in microbial biochemistry.

Biochemical Methods—zonal centrifugation, density gradient work. Radioisotope methodology. Chromatography and gel filtration techniques.

Molecular Biology and Genetics—genetic code, regulation of genes. Control of RNA, DNA and protein synthesis. Genetic systems in bacteria, viruses and fungi. Mutation, transformation, transduction and conjugation, together with their relevance to everyday bacteriological practice.

Medical Bacteriology

Microbial Classification and Identification—modern concepts of microbial classification. Principles of isolation, identification and preservation of bacteria and fungi, particularly those of medical importance.

Bacterial Toxins and Metabolites—recognition, demonstration and composition of products of bacterial metabolism. Species specific and species related toxins. Enzyme activators and inhibitors.

Environmental Bacteriology and Epidemiology—influence of bacteria on various environmental situations. Typing methods.

Antibiotics and Chemotherapeutic Agents—chemistry and classification. Pharmacology, laboratory aspects. Bacterial and fungal resistance.

Antimicrobial Agents—principles of sterilisation. Sterility testing. Disinfection. Composition, modes of action, problems of evaluation.

Microbial Aspects of Immunology—host response to infection. Preparation of antigens and antisera. Immuno-diagnostic techniques.

Appendix G

Institutions Offering Coursework for the Institute of Medical Laboratory Science (IMLS) Special Examination for Fellowship by Specialization

Institution	Specialization*
Bristol Polytechnic	A, B, C, D, E, F, G
Bromley College of Technology	A, B, C, D
Cambridgeshire College of A & T	A, C, D, E
City of Birmingham Polytechnic	A, C, D, E, G
Harrow College of Higher Education	C, E, F
Dublin College of Technology	A, B, C, D, E
Glasgow College of Technology	A, B, C, D, E
Hull College of Higher Education	A, C, D, F
Leeds Polytechnic	A, B, C, D, E, F
Liverpool Polytechnic	A, B, C, D, E
Manchester Polytechnic	A, B, C, D, E, F, G
Newcastle-upon-Tyne Polytechnic	A, B, C, D, E
North East Surrey College of Technology	A, B, C, D, E, F, G
Paddington College	A, B, C, D, E, F, G
Portsmouth Polytechnic	A, B, C, D, E, F
Preston Polytechnic	A
Salisbury College of Technology	G
Sheffield City Polytechnic	A, B, C, D, E, F
Southampton College of Higher Education	D
South Glamorgan Inst. of Higher Education	A, B, C, D, E
Trent Polytechnic	A, C, D, E, F, G
Ulster College, N. Ireland Polytechnic	A, C, D, E

*A—Bacteriology; B—Blood Group Serology; C—Clinical Chemistry; D—Hematology; E—Histopathology; F—Immunology; G—Virology.

Appendix H

Certificate in Medical Laboratory Management
Study Scheme for Management of Scientific Departments

This course is designed for staff who may be or have been appointed to posts with managerial responsibility in scientific departments. The intention is to inculcate a sophisticated approach to management and an awareness of the management techniques which modern practice demands. As successful completion of the course should assist in the development of individual potential, participatory methods, including projects and case studies, must be incorporated as fully as possible.

STRUCTURE AND FINANCE OF THE HEALTH SERVICES

Organisation structure of the NHS and related scientific services.

Allocation and employment of capital within the Health Service and Social Services.

PRINCIPLES AND PRACTICE OF MANAGEMENT

Purpose and nature of management.

Accountability, authority and responsibility; delegation of authority and span of control.

Role of the manager within the organisation.

Personnel. Man management, job analysis, job description, discipline, laboratory safety.

Interviewing techniques associated with: selection, induction, counsel, discipline and grievance handling.

Personnel assessment and evaluation.

Training and education of staff, in-service training, evaluation and validation of training processes.

Role of the various bodies involved in education and training (e.g. Institute of Medical Laboratory Sciences, colleges, Council for Professions Supplementary to Medicine, national certificate joint committees). Technician Education Council and Scottish Technical Education Council.

Roles of personnel departments, and relationship with these departments.

ORGANISATIONAL SOCIOLOGY

Social systems in the NHS at national and district levels and their effect on scientific services.

Functions of, and distinctions between, the following groups: professional and managerial; advisory and executive; those with power and those with authority.

SOCIAL PSYCHOLOGY

Individual behaviour; motivation and attitudes.

The learning process and training.

Influencing individual behaviour; leadership, discipline; incentives and resistance. Group relationships, primary and secondary groups, conflict, co-operation and objectives.

Special problems related to: highly automated and mass-production laboratories; the very small hospital; the large complex teaching hospital and group departments.

LEGAL ASPECTS

A summary of the sources of law, branches of law and law courts.

Knowledge of the law relevant to managers and in particular managers in the scientific service, including: the common law of contract; negligence; relevant legislation on employment, environment, labour relations, safety, and the use and misuse of drugs and medicinal products.

LABOUR RELATIONS

An appreciation of the different perspectives in which labour relations are seen by national bodies representing, respectively, employees, employers and professional groups.

The parties in industrial relations: national and local. National disputes, local disputes (including discipline, grievance handling and appeal procedures).

Trade Unions. Purpose, organisation and legal status.

Whitley Council. Purpose and composition; mode of action.

MANAGEMENT TECHNIQUES

Financial control. The laboratory manager and capital utilisation. Elements of costing and cost analysis. Theory and practice of budgetary control and output budgeting.

Planning—short, medium and long term. Internal and external environment of the department. Planning objectives, criteria and constraints for regions, areas, districts, departments and individuals. Methods of assessing results.

Communication. Purpose and principles. Effective transfer of information, ideas and values to achieve organisational goals.

Methods of Communication. Channels of communication, official and unofficial. Organisation, interpretation, and presentation of facts and ideas. Convening and organising meetings and conferences. Role of the chairman. Agendas and minutes. Effect of organisational structure on communications. Barriers to effective communication.

Management Services. Design and lay-out of department. Creating an awareness of the value of management services and their applications in the scientific department.

Stock Control Methods. Statistical control. Charts, sampling theory, probability theory.

Management Information. Systems and uses. Record systems. Documentation and reporting. Basic understanding of computers. A systems approach to organisation and management.

Appendix I

Medical Laboratory Training

Suggestions from the Institute of Medical Laboratory Technology in relation to the Ordinary National Certificate in Sciences

It is recommended that student medical laboratory technicians should receive at their place of employment organised and systematic training in all the principal aspects of medical laboratory work, including the following:

1. Bulk preparation and storage of distilled and deionised water. Use, care and cleaning of glassware, syringes and other surgical apparatus. Selection and testing of glassware and cotton wools. Operation of hot-air ovens, incubators, water baths, refrigerators, gas cylinders and valves. Preparation of filters.

2. Procedures for reception and recording of specimens. Post office regulations. Storage, handling and disposal of infected material and dangerous compounds. Safety precautions in the laboratory and emergency treatment for accidents.

3. Care of laboratory animals. Cage sterilisation. Killing of animals for post-mortem examination. Disposal of cadaver and other wastes.

4. Sterilisation by steam, dry heat, red heat, boiling, filtration and chemical methods.

5. *Bacteriology*

   Preparation of films of clinical material. Wet preparations. Motility. Microscopic examination of urine for bacteria, erythrocytes and leucocytes.

   Constituents and methods of preparing:

   (a) Stains for Gram's method and its modifications, Ziehl-Neelsen, methylene blue.

   (b) Media, including nutrient broth, nutrient agar, blood and chocolate agar, nutrient gelatine, MacConkey's medium, desoxycholate-citrate agar, peptone water and peptone water sugars, Loeffler's inspissated serum, Dorset's egg, cooked meat broth.

   Aerobic and anaerobic culture methods. Use of wire loops and spreaders. Inoculation of plate, slope, stab and shake cultures. Simple tube and slide agglutination tests. Tube and slide methods for coagulase test for staphylococci.

6. *Blood Transfusion*

   Methods of ABO grouping (including A2) and selection and testing of grouping sera. Methods for D antigen: detection of complete and incomplete forms of D antibody by saline, albumin and antiglobulin techniques. Titrations of D antibody.

General principles of care and organisation of blood banks. Storage of grouping sera. Preparation of pyrogen-free distilled water. Preparation of anticoagulant solutions. Haemoglobin screening by specific-gravity technique.

Conditions for storage of blood, plasma and plasma substitutes and criteria of fitness for use. Preparation of pooled plasma and concentrated erythrocyte suspensions. Cleaning and preparation of taking sets. Methods for transport of blood.

Maintenance of records.

7. *Chemical Pathology*

Preparation of standard solutions of acids, bases, salts, and of buffer solutions.

Preservatives and anticoagulants.

Techniques in the examination of:

(a) Faeces: occult blood and trypsin.

(b) Cerebrospinal fluid: appearance, chloride, glucose, protein.

(c) Urine: appearance; specific gravity; pH; detection of protein, sugars, ketones, bile pigments, bile salts, urobilinogen, urobilin, blood. One-dimensional chromatography of sugars. Quantitative estimation of amylase, urea, chloride, glucose, protein.

(d) Blood: quantitative estimation of urea and glucose.

8. *Haematology*

Preparation of blood films and recognition of types of cells. Visual counting of erythrocytes, leucocytes and reticulocytes. Composition, preparation and use of Romanowsky stains, diluting fluids and other reagents.

Haemoglobin estimation. Derivation and use of colour index, packed cell volume, mean corpuscular volume, mean corpuscular haemoglobin concentration, mean corpuscular haemoglobin.

Erythrocyte sedimentation rate. Osmotic fragility. Use of anticoagulants for blood specimens. Bleeding and clotting times. 'One stage' prothrombin time.

9. *Histopathology*

Fixatives. Preparation and use of formal saline, Zenker-acetic, Zenker-formal, Carnoy, Bouin, formal sublimate.

Treatment of fixed material. Decalcification.

Dehydration, clearing, impregnation and embedding procedures.

Properties of various waxes. Use of automatic tissue-processing machine. Setting up and use of various types of microtome. Sharpening and care of knives. Manipulation of paraffin sections and their attachment to slides.

Recognition and correction of faults in blocks and sections.

Storage of blocks.

Frozen sections.

Staining and mounting. Preparation, and use of Erhlich's, Mayer's, Harris' and Weigert's haematoxylin. Eosin as a counterstain. Van Gieson's method for connective tissue. Special methods for haemosiderin, mucin, elastic fibres, bacteria. Mounting media. Storage of slides.

Appendix J

General Standards Required of Laboratories in Which Trainees for HNC Are Accepted

Where it is intended to build a completely new laboratory in which trainees are to be accepted, the Board assumes that standards will not fall below those specified in current Building Notes. The Board will expect compliance with the following:

1. The provision of:
   (a) At least 3 metres of bench run for each member of laboratory staff employed, including professional, clerical and ancillary workers. This length of bench is cited as an average requirement; needs may vary according to the laboratory discipline. Benches may be partially occupied by static apparatus, for which allowance must be made when determining the minimum run.

   Each professional worker requires at least 4.5 square metres of unobstructed circulating space; floor-mounted equipment should be taken into account when this is determined.

   (b) Separate laboratories for hazardous procedures, designed and equipped to conform with current codes of practice.

   (c) Adequate storage and office accommodation separate from the laboratory areas.

   (d) Suitable areas for receiving and attending to out-patients, including toilet facilities.

   (e) Satisfactory staff amenities conducive to study and of a size sufficient for the number likely to be employed. There should be rest and duty rooms with provision for leaving laboratory clothing outside, and changing rooms with staff toilets including hand-washing facilities.

   (f) Facilities for hand-washing, actually within laboratories where specimens are handled and close to working areas; laboratory sinks are not regarded as suitable for this purpose.

   (g) Accommodation for tutorials, lectures, practical exercises and demonstrations. These are an important component of facilities for professional training and, in large centers, are needed separately by each discipline.

   (h) Reading and reference facilities. Although the hospital or other library may offer reading accommodation, "bench books" for each discipline should be available within the laboratory.

2. Precautions against fire, drawn up with the local Fire Prevention Authority, should include the provision of separate stores for flammable material and designated areas, within each laboratory, for volatile reagents.

   Access to fire escapes must not be impeded.

3. Some laboratories may be regarded as attracting Crown exemption. Even though certain statutory provisions may not necessarily be applicable, the Board expects compliance with standards laid down in such Statutes as, for example, the Health and Safety at Work Act 1974, the Offices, Shops and Railway Premises Act, and the Factories Act.

Laboratory Based (In-Service) Training

1. It is the Board's duty to ensure that an approved course of training leads to a qualification that itself fits a person to practise his profession. To permit eligibility for State Registration, in-service training must provide experience in appropriate technical procedures, so that junior staff including graduates can take full advantage of education courses in the medical laboratory and other sciences.

2. Suitable training, complementary to education courses, can be obtained only by working in a recognised medical or veterinary laboratory. The growth of medical laboratory sciences, and the centralisation of facilities has resulted in the division of hospital laboratories into highly specialised sections. Concurrent part-time further education promotes adaptability; to complement this, the Board believes that the main objective of vocational training should be versatility. Since several instructors and supervisors may become involved, it is essential that each training course should be co-ordinated and carried out under the control of a senior member of the laboratory staff, whose duties are referred to in paragraph 6.

3. A balance has to be reached in each laboratory between the vocational needs of trainees and the wider requirements of the laboratory service; careful planning of training in relation to the available resources will be needed for the one to be met without detriment to the other.

4. A broad competence must be achieved by a flexible coverage of subjects within a chosen discipline if need be by short periods of secondment. It is recognised that trainees cannot become expert in every special technique, but a high degree of competence can be expected in some by a realistic selection of specified topics.

5. For those without an approved qualification, in-service training in a medical laboratory discipline should be concurrent with college-based further education. The two must be satisfactorily aligned and laboratories must receive information from the college to enable them to plan training without unnecessary duplication. Liaison, preferably through an appropriate local committee needs to be established and maintained between each college offering a course, and hospital centres or PHLS units. Small satellite laboratories must not become isolated from such arrangements. Whilst it may not be realistic for all to be represented on a liaison committee, Area Authorities will need to establish suitable channels of communication.

6. To ensure adequacy of training an experienced member of the laboratory staff should be given specific responsibility for training within a group of hospital laboratories. This officer, who would normally be a Fellow of the Institute of Medical Laboratory Sciences, should have sufficient experience and authority to carry out effectively all the duties involved in planning and controlling training arrangements including correlation with education courses, counselling trainees and monitoring their progress.

7. Rotation within single discipline departments might necessitate senior staff in those departments accepting responsibility for supervising particular aspects of in-service training.

8. The officer in charge of the training programme will require regular reports from the supervisors of training in the various departments and should from time to time discuss their progress with trainees.

9. The length of time available for training in the medical laboratory is limited. The training course therefore has to be concentrated and must be planned from the beginning. All trainees should understand in advance what is involved and how it is to be achieved. The Board, or Statutory Visitors appointed by the Board, may require to receive a report on any such training programme.

10. The initial in-service training needs of those admitted to college-based courses in the medical laboratory sciences through possession of GCE 'A' levels will differ from those of ONC or TEC Certificate holders; it is desirable for the former to have an induction course which might be arranged in common for junior staff from different departments. At this induction level, as with advanced training, it might be necessary to arrange secondment to other laboratories to provide a realistic coverage of essential topics.

11. Trainees should keep a written record of what they are taught as well as the practical notebooks required by the college for their courses. The officer responsible for training may also need to see practical notebooks and project work undertaken at a polytechnic or college.

12. Employing authorities must provide adequate resources for satisfactory training. Laboratory accommodation, study and rest rooms should, wherever possible, conform to the Board's General Standards required of centres in which trainees are to be accepted. Trainees should become conversant with the ethics of the profession; they should attend scientific meetings and remain abreast of the literature relating to medical laboratory sciences. Relevant journals and reference texts should be available as "bench books" in each working laboratory, in addition to facilities available as local library holdings.

13. Applicants with approved science degrees, or other approved qualifications, must work for at least twelve months in a hospital, Blood Transfusion Service, Public Health Laboratory Service or veterinary laboratory recognised by the Board to be suitable for in-service training. Much in the previous paragraphs in this section applies to these trainees who, having completed a course of education, will not have had the necessary vocational experience in medical laboratory work. Within the restricted time available for this training, particular attention must be paid to acquiring competence in as realistic a selection of specialised techniques as can be chosen.

14. Because of the inter-disciplinary nature of work in some laboratories, the Board appreciates that the scope of training cannot always mirror the schemes described elsewhere [in this booklet]. It is insistent, however, that the outcome should be a coherent programme, relevant to the chosen discipline and capable of imparting competence in as wide a field as possible. To this end, the Board or its Visitors may require periodic access to programme plans and trainees' notes.

15. The training given should be complementary to the applicant's qualification; for example a graduate with some experience in microbiology should properly receive further training in a microbiology laboratory. Adequate training within a different discipline might not be possible for the same person during a twelve month period. Applicants for registration will be required to specify the training received; additionally they will be required to provide an independent assessment of the degree of competence attained.

Appendix K

Medical Laboratory Technicians Board Overseas Qualifications Accepted for Registration

In accordance with its powers under Section 3 of the Professions Supplementary to Medicine Act, 1960, the Board has approved the following Overseas qualifications as being acceptable for State Registration:

(a) *Australia*

The Diploma of the Australian Institute of Medical Technologists obtained after training and examinations leading to Associate Membership of that body.

(b) *Austria*

The Diplomierte Medizinisch-Technische Assistentinnen granted by the Austrian State after training and examinations conducted at the Schools of Medical Laboratory Technology at Graz, Innsbruck or Vienna, provided the holder has a combined period of at least five years' training and approved practical experience.

(c) *Belgium*

The qualification granted by the Ministry of Education, after training and examinations conducted at approved training institutions for medical laboratory technologists in Belgium, provided that the holder has, since qualification, acquired not less than twelve months' practical experience acceptable to the Board.

(d) *Canada*

(i) The Advanced Level Certificate (A.R.T.) obtained after training and examinations conducted by the Canadian Society of Medical Laboratory Technologists.

(ii) The Registered Technologist qualifications of R.T. (General) and R.T. (Subject) if obtained before the 31st December, 1963, after training and examinations conducted by the Canadian Society of Medical Laboratory Technologists and provided that the holder has had since qualification a further period of five years' whole-time practical experience acceptable to the Board.

(e) *Ceylon*

The qualification granted by the Department of Health Services, Colombo, after training and examinations conducted at the Ceylon School of Medical Laboratory Technology, provided the holder has since qualification completed two years' practical experience in a major hospital laboratory, and one years' satisfactory service in a medical laboratory in the United Kingdom.

(f) *Czechoslovakia*

The State qualification for medical laboratory technicians, provided the holder has completed at least two years' post-qualification satisfactory practical and technical experience. (The standard of the experience to be assessed by means of an interview).

(g) *Denmark*

The qualification of Registered Hospital Laboratory Technician as authorised by the Board of Education of Hospital Laboratory Technicians, Copenhagen, and obtained after training and examinations conducted by the Society Landssammenslutningen af Hospitals-laboranter in accordance with Document U-2 1958, provided the holder has had, since qualification, a further period of three years' whole-time practical experience acceptable to the Medical Laboratory Technicians Board.

(h) *France*

The qualification of "Laborantin d'analyses medicales", provided the holder has completed a combined period of training and satisfactory practical experience amounting to at least five years.

(i) *Guyana*

The Post-Certificate Diploma in Chemical Pathology, provided the holder has completed a combined period of training and satisfactory practical experience amounting to at least five years.

(j) *Holland*

The qualifications held by Dutch medical laboratory technicians who have qualified by way of the technician (or "C") examinations organised by the Royal Dutch Chemical Society or by the Board of the S.A.L. (Stichting ter behartiging van de vorming tot Assisterend Laboratoriumpersoneel), or the New Diploma 'Hoger Beroepsonderwijs' issued by authorised schools under Article 29 of Dutch Laws, provided that since qualification the applicant has had not less than three years' full-time practical experience acceptable to the Board.

(k) *Hong Kong*

The Higher Technician Certificate in Medical Laboratory Technology from the University of Hong Kong provided the holder has acquired three years' practical and technical experience acceptable to the Board in approved laboratories of the Hong Kong Government or University of Hong Kong.

(l) *New Zealand*

The Certificate of Proficiency in Medical Laboratory Technology (formerly Hospital Laboratory Practice) granted by the Department of Health of New Zealand after training and examinations conducted by the New Zealand Medical Laboratory Technologists' Board.

(m) *Norway*

The qualification granted (following training and examinations) by the Schools for Medical Laboratory Technicians recognised by the Norsk Fysiokjemiker-Forbund, provided the holder has completed a period of not less than five years' combined training and whole-time laboratory experience acceptable to the Board.

(n) *Rhodesia*

The Diploma in Medical Laboratory Technology granted after the full training and examinations of the University of Rhodesia.

(o) *South Africa*

The National Diploma in Medical Technology issued by the Department of Higher Education of the Republic of South Africa, provided applicants have also been accepted for registration as Medical Technologists with the South African Medical and Dental Council, or if they hold the National Diploma and have completed a minimum period of four years' practical laboratory experience acceptable to the Board.

(p) *Sweden*

The qualification granted to laboratory assistants after training and examinations established by the Swedish Royal Board of Education conducted at one of the special schools and provided the holder has completed a combined period of at least five years' training and satisfactory practical experience.

(q) *Switzerland*

(i) The Swiss Diploma for Laboratory Technicians endorsed and signed by the Swiss Red Cross, obtained after training and examinations conducted in accordance with the Rules of the S.R.C., and provided the holder has had, since qualification, a further period of two years' whole-time practical experience acceptable to the Board.

(ii) The qualifications acceptable for membership of the Association Suisse des laborantines medicales prior to 1962, provided the holder of such qualification has a combined period of at least five years' whole-time training and practical experience acceptable to the Board.

(r) *United States of America*

(i) The qualification M.T. (A.S.C.P.) obtained after training and examinations of the American Society of Clinical Pathologists.

(ii) The qualification of "California Licensed Technologists" (CLT).

(s) *West Indies*

The Diploma in Medical Technology obtained after training and examinations conducted by the Society of Medical Technologists of the West Indies.

(t) *Yugoslavia*

The state qualification for medical laboratory technicians, provided the holder has completed at least two years' post-qualification full-time laboratory experience acceptable to the Board.

NOTE:

Certain Science Degrees obtained at overseas universities and approved by the Board, provided the holder has acquired, since qualification, twelve months' whole-time practical and technical experience acceptable to the Board.

(i) Science Degrees deemed by the Board to be appropriate include as principal subjects one or more of the following: biochemistry, biology, chemistry, microbiology, physics, physiology (animal) and zoology.

(ii) All applicants for registration will be required to produce documentary evidence of their qualifications and of their practical and technical experience.

Appendix L

Member Societies of the International Association of Medical Laboratory Technologists

Australia: Australian Institute of Medical Technologists, PO Box 30, Brisbane North Quay, Queensland 4000.

Austria: Verband der Diplomierten Medizinisch Technischen Assistentinnen Desterreichs, Lazarettgasse 14, Postfach 32, 1097 Weir..

Belgium: Belgische Vereniging van Laboratorium Technologen, Postbus 205, B-3000 Leuven.

Chile: Colegio de Tecnologos Medicos de Chile, Jose Miguel de la Barra 480, Dep. 405, Clasificador 303, Santiago de Chile.

Denmark: Landssmmenslutningen af Hospitalslaboranter, Nannasgade 28, 2200 Kopenhagen N.

Dominican Republic: Asociacion Dominicana de Tecnologos Medicos y Technicos en Analisis Clinico Inc., Mrs. Vanessa de Boumigal T.M., President, Avenida Bolivar No. 119, Condominio San Jorge, Apartamento 102, Santo Domingo.

Finland: Laboratory Nurses in Finland, Laboratoriosairaanhoitajat Ssl/UPY, Toolontullinkatu 8, SF—00250 Helsinki 25.

: Suomen Laboratorio Hoitajayhdistys Toolontullinkatu 3 A5 00250, Helsinki 25.

France: Association Nationale du Personnel Technique Qualife des Laboratoires d'Analyses Biologiques, 6 Place de la Gare, 67 Strasbourg, Bas Rhin.

Germany: Deutscher Verband Technischer Assistentinnen und Assistenten DVTA, Ruhrallee 59, 43 Essen.

Holland (Netherlands): De Versniging van Medische Analysten, Wilheminapark 52, 3581, NM Utrecht.

Hong Kong: Hong Kong Medical Technology Association, Mr. Sydney C.F. Yuen c/o Room 210 Nr. 9, Ice House Street, Hong Kong.

Iceland: Meinataeknafelag Islands, P.O. Box 89, Reykjavik.

India: Indian Medical Laboratory Technologists' Association, 55 Harish Mukherjee Road, Calcutta 25.

Ireland: Medical Laboratory Technologists Association, 29 Parnell Square, Dublin 1.

Italy: Associazione Nazionale Tecnici di Laboratorio, Via Palombini 19, Casella Postale 9094, 00165 Roma Aurelio.

Japan: The Japanese Association of Medical Technologists, 5-9-1 Shirogane, Minatoku, Tokyo 108.

Korea: Choong Hy Han, President, Korean Association of Medical Technologists, Room 301, Dae Kwang Building Nr. 28-2, 1ka Chongro Chongro-ku, Seoul, Korea.

Malaysia: The Institute of Medical and Health Laboratory Technology Malaysia, c/o Institute for Medical Research, Jaslan Pahang, Kuala Lumpar.

New Zealand: The New Zealand Institute of Medical Laboratory Technologists Inc., Mr. B.T. Edwards, Haematology Department, Christchurch Hospital, Private Bag, Christchurch 1, New Zealand.

Nigeria: Association of Medical and Veterinary Laboratory Technologists, c/o Department of Haematology, Mr. E.A. Usanga, University College Hospital, Ibadan, Nigeria.

Norway: Norsk Fysiokjemikerforbund, Rådhusgt. 4, Oslo 1.

: Laboratoriesykepleiergruppen i Norsk Sykepleierforbund, c/o Margarethe Orvig, Avd 1X, Ulleval Sykehus, Oslo 1.

Peru: Associacion de Laboratoristas Clinicas de la Caja Nacional del Seguro Social, Mrs. Helia Garcia, President, R.S. No. 0045-71-PM/OP., Lima.

Philippines: Philippine Association of Medical Technologists Inc., 4th Flr. Mt. Banawe Hospital, 62 Quezon Blvd., Ext., Quezon City.

Puerto Rico: Colegio de Technologos Medicos de Puerto Rico, Ave. Domenech Nr. 135 Hato Rey, Puerto Rico 00918.

Singapore: Association of Medical Laboratory Technicians, Singapore, Honorary Secretary, Mr. Kamarudin Ali, Medical Centre, 4-A, College Road, Singapore 3.

South Africa: Society of Medical Laboratory Technologists of South Africa, c/o South African Institute for Medical Research, P.O. Box 1038, Johannesburg.

Sweden: Svenska Laboratorieassistent Foreningen (SLF), Fack, 10041 Stockholm.

: SSF:s Rikssektion for Laboratorie Skoterskor, c/o Eva Frendesson, St. Eriksgatan 231, 11239 Stockholm.

Switzerland: Schweizerischer Fachverband des medizinisch-technischen Laborpersonals, Postfach 91, 4003 Basel.

Uganda: Association of Medical Laboratory Technologists in Uganda, Makere University, Mr. L.L.O. Kerchan, P.O. Box 7062, Kampala.

United Kingdom: Institute of Medical Laboratory Sciences, 12 Queen Anne Street, London W1M 0AL.

United States of America: American Society for Medical Technology, Executive Office ASMT, Suite 200, 5555 West Loop South, Bellaire, Texas 77401.

West Indies: Society of Medical Technologists (W.I.), Pathology Department, University College, Mona Kingston, Jamaica.

Zambia: Zambian Society of Medical Laboratory Technology, Mr. R.B. Simukoko, P.O. Box 138, Luska.

Appendix M

Syllabus for the Intermediate Examination

[The list of recommended reading has been omitted but is available from the IMLS.]

(Operative from 1st January, 1964; Revised 1965)

Candidates, being fully registered students of the Institute, must have English language and mathematics among their passes in the General Certificate of Education at Ordinary level; they should also have reached an equivalent standard in physics, chemistry and biology and have an elementary knowledge of general physiology. Those deficient in any of these subjects are advised to attend a suitable course at a technical institution. Candidates should have a basic knowledge of routine laboratory duties and methods common to the five subjects of bacteriology, blood transfusion, chemical pathology, haematology and histopathology.

APPARATUS

Principles, use and maintenance of balances (simple chemical), stills (metal and all glass), centrifuges, Venturi pumps, manometers, thermometers, refrigerators, water baths, incubators, hot air ovens, autoclaves, single cell absorptiometers, direct vision spectroscopes, hydrometers, gas cylinders and valves. Use, care, cleaning and sterilisation of glassware, including test tubes, slides, petri dishes, pipettes and other graduated apparatus; syringes and other surgical instruments. Filters: paper, sintered glass, asbestos, membrane; Buchner funnels.

GENERAL

Post Office regulations for sending pathological specimens by post. Reception and recording of specimens. Storage, handling and disposal of infected materials and dangerous compounds. Safety measures and emergency treatment for accidents. Production and storage of distilled and deionised water. Selecting and testing glassware and cotton wools. Storing and cleaning new glassware.

Animals

Housing, feeding, cleaning and handling of normal and experimental rabbits, guinea pigs, rats and mice. Cage sterilisation and disposal of infected excreta. Killing and preparing animals for post-mortem examination.

Microscopy

Elementary principles of microscopy. Manipulation and care of the microscope; determination of its magnifying power.

Sterilisation

Pressure steam, flowing steam, dry heat, red heat, boiling, filtration and chemical.

Simple Glass Manipulation

Making dropping pipettes, Pasteur pipettes, capillary tubes, Wright's capsules, right angle bends and glass bulbs.

Volumetric and Dilution Methods

Use of graduated and dropping pipettes. Preparation of percentage, normal and molar solutions.

BACTERIOLOGY

Preparation of Material for Microscopic Examination

Making and fixing films of micro-organisms. Methods of preparing films of clinical material. Making wet preparations. Examination for motility. Recognition in urine deposits of erythrocytes, leucocytes and bacteria.

Staining Techniques

Principles of staining. Constituents, methods of preparation and use of the stains for Gram's method and its modifications, Ziehl-Neelsen's stain, methylene blue.

Culture Media

Colorimetric method of estimation and adjustment of pH. Use of inspissator and Koch's steamer. Constituents and method of preparation of nutrient broth and agar (fresh meat or meat extract base; digest media); blood and chocolate agar; nutrient gelatine; MacConkey's medium, solid and liquid; desoxycholate citrate medium; peptone water and peptone water sugars; Loeffler's inspissated serum; Dorset's egg medium; cooked meat medium.

Culture Methods

Use of wire loops, straight wires and spreaders. Inoculation of plate, slope, stab and shake cultures. Anaerobic cultivation, using McIntosh and Fildes apparatus and its modifications. Cultivation in carbon dioxide air mixtures. Agglutination tests: technique of simple tube and slide agglutination tests. Tube and slide methods of coagulase test for staphylococci.

BLOOD TRANSFUSION

Blood Grouping

Elementary principles of blood groupings and factors affecting results of tests. Care and cleaning of apparatus used in blood grouping.

Blood Group Antigens and Antibodies

Methods of ABO blood grouping (including A_2). Selection and testing of ABO grouping sera. Causes of inaccuracies and use of controls. Elementary knowledge of Rhesus blood group system. Methods of detecting presence of D antigen. Detection of complete and incomplete forms of D antibody by saline, albumin and antiglobulin techniques. Titration of D antibody in saline and albumin.

Blood Banks

General principles of the care and organisation of blood banks. Storage of grouping sera. Preparation of pyrogen-free distilled water. Preparation and properties of anti-coagulant solutions used in blood transfusion. Haemoglobin screening of blood donors by specific gravity techniques. Conditions for storage of blood, plasma and plasma substitutes, and criteria of fitness for use. Preparation of pooled plasma and

concentrated erythrocyte suspensions for transfusion. Elementary knowledge of principles of refrigeration, operation and care of refrigerators. Cleaning and preparation of taking sets, including sharpening of needles. Methods and equipment for transport of blood. Maintenance of blood bank records. Knowledge of principles of asepsis.

CHEMICAL PATHOLOGY

Basic techniques in gravimetric, volumetric, gasometric and absorptiometric analysis. Preparation of standard solutions of acids, bases and salts, and of buffer solutions. Use in volumetric analysis of solutions of acids, bases, silver nitrate and potassium permanganate. Preservatives and anticoagulants used for the collection of specimens for the more common investigations. The separation of serum and plasma.

Gastric Juice

Titration of 'free' and 'total' acid.

Faeces

Tests for occult blood and trypsin. Wet preparations for starch and muscle fibres.

Cerebrospinal Fluid

Appearance; estimation of protein, chloride by direct titration, glucose.

Urine

Appearance, specific gravity, pH (by indicators); detection of protein; detection and identification of reducing substances using Benedict's, Bial's, Seliwanoff's and methylamine reagents, enzyme tests (yeast, glucose oxidase), one dimensional chromatography of sugars; detection of ketone bodies, bile pigments, bile salts, urobilinogen, urobilin and blood. Quantitative estimation of amylase (Wohlgemuth method), urea, chloride (Volhard's method), glucose (using Benedict's quantitative reagent), protein.

Blood

Quantitative estimation of urea, glucose.

Candidates will not be examined practically in the estimation of urea or glucose or in the chromatography of sugars but they must know one method for each. Candidates should understand the principles of the common proprietary analytical reagents.

HAEMATOLOGY

Cell Counting

Visual counting of total erythrocytes and leucocytes. Counting of reticulocytes.

Haemoglobin

Estimation of haemoglobin by procedures in common use. Calculation of colour index and mean corpuscular haemoglobin.

Packed Cell Volume

Estimation of packed cell volume. Calculation of mean corpuscular volume and mean corpuscular haemoglobin concentration.

Blood Films

Preparation of blood films. Staining by Romanowsky stains. Principles and com-

position of Romanowsky stains. Recognition of the types of leucocytes normally present in the blood and recognition of simple morphological changes in erythrocytes.

Miscellaneous

Estimation of erythrocyte sedimentation rate. Elementary methods for determination of erythrocyte osmotic fragility. Simple explanation of coagulation: preparation and mode of action of common anticoagulants. Bleeding and clotting times. Simple estimation of 'one stage' prothrombin time.

HISTOPATHOLOGY

Elementary knowledge of cellular structure and composition. Recognition of various types of epithelial cells.

Fixation

Purpose of fixation. Action of formalin, mercuric chloride, potassium dichromate and alcohols as fixing agents. Use of formol-saline, Zenker-acetic, Zenker-formol, Carnoy, Bouin, formol-sublimate. Treatment of fixed material. Methods of removing formalin pigment and mercuric deposits from cut sections.

Decalcification

Methods of decalcification by formic or nitric acid solutions. Methods for determining 'end-point' of decalcification.

Preparation of Paraffin Sections

Dehydration. Clearing: characteristics and uses of xylene, benzene, chloroform and cedarwood oil. Impregnation and embedding, including principles and use of vacuum and paraffin wax ovens. Properties of wax suitable for embedding. Treatment of blocks before cutting. Principles, operation and care of automatic tissue processor; preparation of timing discs; selection and use of various tissue containers. Principles of microtomes and manipulation and use of one of the following: rotary, rocking, sledge. Sharpening and care of microtome knives. Use and maintenance of hones and strops. Manipulation of paraffin sections and their attachment to microscope slides. Recognition and correction of faults occurring in blocks and sections. Storage of blocks.

Staining and Mounting

Principles of staining. Preparation and use of Ehrlich's, Mayer's, Harris's, and Weigert's haematoxylin. Preparation and use of eosin as a counterstain. Van Gieson method for connective tissue. Prussian blue method for haemosiderin. Staining of bacteria in sections by Gram's method or modification, and Ziehl-Neelsen method for tubercle bacilli. Southgate's method for mucin. Verhoeff's method for elastic fibres. Mounting media for stained paraffin sections. Storage of sections.

Frozen Sections

Apparatus: a basic knowledge of its construction and use. Advantages and disadvantages of frozen sections compared with paraffin sections.

Exfoliative Cytology Technique

Principles and applications. Fixation of smears and staining by haematoxylin and eosin, Romanowsky, Papanicolaou.

Appendix N

Part-Time Day Courses in Preparation for the Final Examinations of the Institute of Medical Laboratory Technology

[The name of the professional body was changed to Institute of Medical Laboratory Science after this syllabus was written. The lists of recommended reading have been omitted but are available from the IMLS.]

Each student will take the applied subject in which he proposes to enter the examination, a second subject which in all cases will be biochemistry, and two half subjects, one constituting theoretical instruction directly relating to the applied subject. Groups of subjects will be selected in accordance with the following table. Figures in brackets refer to the numbered syllabuses on the following pages.

Applied Subject	Half Subject	Whole Subject
(160 hours on examination syllabus and 80 hours on supplementary theory over 2 years)	(80 hours over 2 years)	(160 hours over 2 years)
Haematology and Blood transfusion (1, 3) or Histopathology (2, 4)	Physiology (5)	Biochemistry (6)
Bacteriology (7, 10) or Virology (8, 10) or Parasitology (9)	General Microbiology (11)	Biochemistry (6)
Chemical pathology (12, 13)	Biochemical physiology (14)	Physical and organic biochemistry (15)

SYLLABUS FOR THE FINAL EXAMINATION IN HAEMATOLOGY AND BLOOD TRANSFUSION TECHNIQUE (1)

(160 hours)

(Operative from 1st January, 1964)

The syllabus is issued for general guidance and the examination will not necessarily be confined to it. Candidates may be questioned on the APPARATUS, GENERAL, HAEMATOLOGY and BLOOD TRANSFUSION sections of the Intermediate syllabus.

General Haematology

Collection of blood specimens and anticoagulants used. Origin, development and function of blood cells; identification of normal and abnormal forms; chemical composition. General principles of iron metabolism. Synthesis and breakdown of haemoglobin. Oxygen combining power. Blood volume and its physiological variation; dye and radioisotope methods of assessment. Methods of counting erythrocytes, leucocytes, reticulocytes and platelets. Cell survival, including differential agglutination and radioisotope assessment. Principles of techniques using radioactive isotopes of

iron, chromium and phosphorus. Haematocrit and microhaematocrit. Calculation of absolute values. Normal ranges of variation. Errors inherent in sampling and technique. Elementary statistical analysis.

Preparation of blood and bone marrow films. Romanowsky staining methods. Differential leucocyte counting. Supra-vital preparations and demonstration of Heinz bodies or reticulocytes. Cytochemical methods for peroxidase, alkaline phosphatase and fat. Periodic-acid-Schiff and Feulgen reactions. Demonstration of free iron. Nuclear sex determination. L.E. cell preparation. Staining and recognition of blood parasites. Erythrocyte sedimentation rate: methods used and sources of error. Rouleaux formation.

Spectroscopic recognition and measurement of haemoglobin, its derivatives and breakdown products; standardisation and maintenance of accuracy. Schumm's test. Estimation of serum bilirubin. Investigation of haemolysis. Assessment of erythrocyte fragility. Donath-Landsteiner and Ham's tests. Haptoglobin estimation. Nomenclature and classification of common haemoglobinopathies. Elementary genetics. Methods of investigating haemoglobinopathies including electrophoresis, solubility studies, alkali denaturation and sickling. Classification of changes in cell morphology in anaemias, leukaemias and allied states, and in leucoerythroblastosis. Principles underlying assay of vitamin B_{12}, folic acid and formiminoglutamic acid.

Coagulation and Fibrinolysis

Nomenclature and classification of normal mechanisms. Measurement of bleeding time. Platelet stickiness. Clot retraction. Vascular fragility. Assessment of coagulation time; one-stage prothombin time, 'Thrombotest'; thromboplastin generation, assay of antihaemophilic factor (VIII); recalcification time. Rapid demonstration of fibrinogen deficiency. Simple assessment of fibrinolysis. General principles underlying clotting factor assay and measurement of fibrinolytic activity. Preparation of brain thromboplastin extracts. Platelet substitute solutions. Fibrin plates.

Serology

Elementary knowledge of genetics. Inheritance of blood groups and applied theories of immunity. Detailed knowledge of the ABO and Rhesus systems, and a general knowledge of the other blood groups. Selection, processing, standardisation and storage of antisera. Techniques for phenotypic and genotypic determination of blood groups. Plant lectins. Preparation and preservation of standard red cells and of enzyme-modified red cells. Detection, identification and titration of complete and incomplete warm and cold acting antibodies. Determination of secretor status: titration of group-specific substances. Preparation and standardisation of anti-human globulin serum. Serological recognition of iso- and auto-immunisation. Direct and indirect anti-globulin (Coombs) tests. Titration of haemolysins. Elution techniques. Gamma-globulin neutralisation. Enzyme techniques. Complement-binding assessment. Selection and use of controls in serology. Paul-Bunnell test.

Transfusion

A thorough knowledge of compatibility procedures. Operation of a blood bank and maintenance of records. Selection and testing of donor blood. Methods of blood collection including complications. Tests for pyrogens. Preparation of pyrogen-free fluids and anticoagulant transfusion solutions. Assessment of suitability. Storage of blood and its effects on cells in vitro and in vivo. Preparation of concentrated erythrocytes, 'leucocyte free' blood, and platelet rich plasma for transfusion. Preparation of fresh frozen plasma and of fractionated plasma components. Preparation of dried and liquid plasma; storage and criteria of fitness for use. Plasma substitutes. Effects of incompatible transfusion and their laboratory investigation. Screening tests to guard against transmission of disease by transfusion.

Laboratory Management and Apparatus

Laboratory planning. Maintenance of records. Selection, testing, use and maintenance of apparatus including glassware, microscopes, water-baths, incubators, ovens, autoclaves, refrigerators, centrifuges, stills, spectroscopes, colorimeters and absorptiometers. Cleaning of glassware. Minor glass blowing. Preparation of Pasteur volume pipettes. Calibration of pipettes and haemocytometers. Care of transfusion, intravenous and sternal aspiration needles. Theory and practice of microscopy, including dark-ground, fluorescence and phase-contrast apparatus. Principles and use of electronic cell counters, staining machines and electrophoresis equipment. Cleaning, assembly and sterilisation of blood giving and taking sets; use of disposable plastic apparatus. Storage, handling and disposal of infected, dangerous and radioactive materials. Safety measures and emergency treatment after accidents. Housing and management of laboratory animals. Application of the Cruelty to Animals Act (1876).

SYLLABUS FOR THE FINAL EXAMINATION IN HISTOPATHOLOGY TECHNIQUE (2)

(160 hours)

(Operative from 1st January, 1964; revised 1965)

The syllabus is issued for general guidance and the examination will not necessarily be confined to it. Candidates may be questioned on the APPARATUS, GENERAL and HISTOPATHOLOGY sections of the Intermediate syllabus.

Histology

A basic knowledge of the histological structure of normal human tissues is required.

Fixation

Purpose and effect of fixation. Composition and uses of fixatives and their respective actions on tissue components. Microscopical appearance of tissues after various methods of fixation. Function and scope of secondary fixation, post-fixation and post mordanting.

Decalcification

Methods for the removal of calcium salts to permit sectioning, including surface decalcification.

Processing Techniques

Paraffin wax: schedules and reagents for manual and mechanical tissue processing.

Other embedding media: celloidin-paraffin, celloidin and low viscosity nitrocellulose, water soluble and ester waxes, gelatine, agar, synthetic resins, applications and methods.

Microtomy

Microtomes: manipulation and uses of rocking, rotary, sledge, freezing and cryostat microtomes.

Knives: selection and maintenance of knives for various microtomes; manual and mechanical sharpening.

Section cutting: techniques used with different embedding media; attachment of sections to slides; frozen section techniques; methods for rapid diagnosis.

Staining, Impregnation and Histochemical Methods

Theory and applications of staining, metallic impregnation and histochemical methods. Properties of natural and synthetic dyes. Composition, preparation and storage of staining reagents. Testing of reagents.

Common nuclear stains and counterstains for general tissue structure.

Methods to demonstrate:

Connective tissues and fibres, including bone.

Extracellular products including amyloid and fibrin.

Parasites, fungi, bacteria and virus inclusion bodies.

Pigments: endogenous, exogenous and artefact.

Cytoplasmic structures including secretory granules.

Cells and fibres of the nervous system.

Lipids, polysaccharides, DNA and RNA.

Enzymes: alkaline and acid phosphatase, DOPA-oxidase and succinic dehydrogenase.

Preparation and staining of sections for photomicrography.

Composition, properties and application of mounting media used for microscopical preparations.

Exfoliative Cytology

Cytology: a knowledge of the normal cell, its structure and reproduction. The recognition of the various epithelia. The structure and appearance of the abnormal cell. The cellular content of, for example, serous fluids, breast secretions, cerebrospinal fluid, prostatic secretions, sputum, urine, and cervical and vaginal secretions.

The selection and preparation of fluids and secretions for microscopic examination.

Fixation: the preparation and mode of action of cytological fixatives.

Staining: e.g., haematoxylin and eosin, Papanicolaou, Feulgen, acridine orange.

Ancillary Techniques: flotation and filtration methods, fluorescence methods. Rapid paraffin processing of fluid, clot and sputum.

Specialised Techniques

A limited knowledge of freeze drying, autoradiography, tissue culture, microincineration, the ultra microtome.

Microscopy

Theory and practice of microscopy and micrometry. Care and manipulation of monocular and binocular microscopes and their component parts. Principles and technique of dark ground, fluorescence, phase contrast, and polarising microscopy.

Museum Methods

Preparation of material for museum purposes and photography. Processing and presenting museum specimens. Staining of gross specimens to demonstrate iron, calcium, fat and amyloid. Maceration and injection methods. Storage of specimens for teaching purposes.

Laboratory Management

Reception, recording, storage, filing and indexing of specimens, sections and blocks. Methods of recording experiments. Laboratory planning. Ventilation, and equipment required for a cutting-up bench. Storage, handling and disposal of infected, radioactive and dangerous materials. Safety measures and emergency treatment for accidents. Housing and management of laboratory animals. Application of the Cruelty to Animals Act (1876).

HAEMATOLOGY AND BLOOD TRANSFUSION (80 hours) (3)

General Haematology

Origin, development and function of blood cells. Identification of normal and abnormal forms. Iron metabolism. Synthesis and breakdown of haemoglobin. Blood volume and its physiological variation. Basis of counting procedures and methods, errors in sampling techniques and statistical analysis. Basis and evaluation of absolute values. Life history of cells and cell survival.

Haemolysis and Allied Phenomena

Nomenclature and classification of the common haemoglobinopathies. Classification and changes in cell morphology in anaemias, leukaemias and allied states and in leuco-erythroblastosis.

Coagulation and Fibrinolysis

Nomenclature and classification of normal mechanisms.

Serology

Inheritance of blood groups and applied theories of immunity. Detailed knowledge of the ABO and Rhesus systems, and a general knowledge of other blood groups.

Blood Transfusion

A thorough knowledge of compatibility procedures.

HISTOPATHOLOGY (80 hours) (4)

Staining, Impregnation and Histochemical Methods

Theory and applications of staining, metallic impregnation and histochemical methods. Properties of natural and synthetic dyes. Composition, preparation and storage of staining reagents. Common nuclear stains and counterstains for general tissue structure.

Exfoliative Cytology

Principles and applications.

Fixation, Decalcification and Processing

Principles of techniques.

PHYSIOLOGY (80 hours) (5)

Tissue Structure

The structural and major histological and cytological characteristics of the tissues and organs of the mammal. Ultrastructure of cells. Microscopy (phase, ultraviolet, interference, dark ground, polarising, fluorescence, micrometry, electron microscopy).

Homeostasis

Circulation of body fluids. Cellular function of the blood. Phagocytosis, immunity, inflammation, healing and repair processes. Respiratory function of the blood. Renal function.

Metabolic Processes

Diet and nutrition. Gastro-intestinal function.

Endocrine System

Role in the regulation of metabolic activity, sexual function, water and electrolyte balance.

Nervous System

General structural features. Major functions of the various regions.

Life Cycle

Growth, morphogenesis of cell division. The main phases of the life cycle of the higher vertebrate. Basis of embryology and morphogenesis. Cell growth and multiplication patterns in embryo, infant, adolescent and adult.

Principles of Genetics

Mendelian inheritance, linkage, mutation, lethal genes, crossing over, sex determination. Multiple alleles.

BIOCHEMISTRY (160 hours) (6)

Solutions

Properties of water including the hydrogen bond. Distribution of water in mammals and other living organisms. Solubility. Gaseous solubility in cell and extracellular fluids. Effects of solute on the properties of solutions. Osmotic pressure, osmole and osmolality.

Electrolytic Dissociation

Properties of electrolytes, electrolysis, conductance. Common electrolytes of the tissues.

Acids and Bases

pH and the hydrogen electrode. Biological importance of pH. Principles used in the determination of pH. pH stability and buffer systems.

Electrochemistry

Oxidation and reduction. Standard electrode potentials. Electrochemical series. The mechanism of biological oxidations. Redox determinations and their significance. Fermentation reactions.

Colloids

Nature of colloidal solutions. Physical properties. Colloidal nature and behaviour of the constituents of the tissue. Absorption in colloidal and other systems. Orientation of molecules at surfaces, emulsions, surface active agents.

The Mechanisms of Enzyme Activity

Chemical reactions and the action of heterogeneous catalysts. Kinetic features of enzyme activity and the influence of external agencies, pH, temperature, co-enzymes, activators and enzyme inhibitors.

Radio-chemistry

General properties of particulate and electromagnetic radiation. Biological applications of radio-chemistry.

Organic Biochemistry

General chemistry of the constituents of plant, animal and bacterial cells. Common

cellular constituents, their chemical constitution and biochemical activities, e.g. chromosomes, nucleoli, nuclear membrane, mitochondria, ribosomes, secretion, secretion granules, storage granules, cell membrane. Detailed study of the chemical constitution and properties of hexoses and pentoses, di- and polysaccharides, fatty acids and their common esters, amino-acids, proteins, protein molecular structure.

Nucleoproteins

Their distribution in cells. DNA, RNA, structural chemical features and their relationships to genetical processes and to protein synthesis.

Steroids, Vitamins and Hormones

Biochemical metabolism. Processes of metabolic interchange. General features of the degradative and synthetic pathways of metabolism. Glycolysis and the tri-carboxylic acid cycle. Metabolism of fatty acids. The nutritional aspects of protein metabolism and relationship of these processes to the major metabolic pathways. Site, location and probable mechanisms in protein synthesis at the intracellular level. Relationships to genetical processes.

General Aspects of Cell Biochemistry

Cell membrane and nature of processes occurring across it. Membrane potential. Secretion mechanisms.

SYLLABUS FOR THE FINAL EXAMINATION IN BACTERIOLOGY TECHNIQUE (7)

(160 hours)

(Operative from 1st January, 1964)

The syllabus is issued for general guidance and the examination will not necessarily be confined to it. Candidates may be questioned on the APPARATUS, GENERAL and BACTERIOLOGY sections of the Intermediate syllabus.

Bacteria

Structure, physiology and reproduction of bacteria. Growth requirements. Classification and nomenclature. Susceptibility of bacteria to physical and chemical agents.

Systematic Microbiology

General principles of methods employed in identifying micro-organisms. Characteristics identifying each important pathogenic species and the non-pathogenic species of interest in medical bacteriology. Bacteriophage typing. Properties of pathogenic fungi and methods employed in their study. Main properties of viruses.

Sterilisation

Principles and methods of sterilisation by physical and chemical agencies, e.g., dry and moist heat, filtration, liquid and gaseous chemicals, ionising radiation. Tests of efficient sterilisation. Testing of disinfectants.

Microscopy

Theory and practice of microscopy including dark ground illumination, phase contrast microscopy and micrometry.

Staining Methods

Principles of staining. Composition, preparation and use of staining reagents required for identification and study of bacteria, other micro-organisms and viruses in films, sections and other preparations.

Culture Methods

Composition and preparation of the types of culture media in general use for the isolation and identification of micro-organisms; properties, purpose and control of their ingredients. Selective media and their modes of action. Special growth requirements of different bacterial species. Atmospheric requirements and methods of providing them.

Serology

A general knowledge of the nature of antigens and antibodies including the antigenic structure of the important pathogens. Principles and methods of performing agglutination, precipitation, complement fixation and absorption tests. Demonstration and estimation of toxins and antitoxins. Fluorescent antibody methods. Gel diffusion.

Antibacterial Drugs

Principles and methods of determining the sensitivity of bacteria. Stability of antibacterial drugs used in these tests. Detection of drug synergism and antagonism. Biological assay of antibiotics and chemotherapeutic agents in body fluids.

Examination of Specimens

Methods used in the collection and examination of the various types of specimens submitted for bacteriological investigation. Cytological methods where relevant. Examination of milk and other foods, water, air, sewage and other materials which may be concerned in the transmission of infection.

Miscellaneous Methods

Principles and methods of performing total and viable bacterial counts. Preparation and standardisation of bacterial vaccines. Preservation of stock cultures. Detection of common intestinal parasites, cysts and ova.

Laboratory Management and Apparatus

Selection and testing of laboratory equipment. Principles, use, and maintenance of laboratory apparatus, e.g., refrigerators, water baths, incubators, ovens, autoclaves, centrifuges, stills. Storage of culture media. Maintenance of laboratory records. Laboratory planning. Cleaning of new and infected glassware. Storage, handling and disposal of infected, radioactive and dangerous materials. Safety measures and emergency treatment for accidents. Housing and management of laboratory animals. Application of the Cruelty to Animals Act (1876).

SYLLABUS FOR THE FINAL EXAMINATION IN VIROLOGY TECHNIQUE (8)

(160 hours)

(Operative from 1st January, 1964)

The syllabus is issued for general guidance and the examination will not necessarily be confined to it. Candidates may be questioned on the APPARATUS and GENERAL sections of the Intermediate syllabus.

Systematic Virology

Nature of viruses, organisms of the psittacosis group, and rickettsiae; methods of multiplication, pathogenesis of infections caused, modes of spread. General prin-

ciples of the methods used for the isolation and identification of an unknown micro-organism presumed to be a virus. Particular characters by which it is possible to identify important pathogenic species, particularly those of the pox group, psittacosis group, influenza group, enterovirus group, arthropod-borne viruses, adenoviruses, viruses of measles, herpes and rabies, and the rickettsiae.

Animal Techniques.

Animals commonly used in the study of viruses. Methods and routes of inoculation. Holding animals. Anaesthesia. Temperature taking. Postmorten examination.

Egg Techniques

Care of fertile eggs. Candling. Inoculation of eggs by amniotic, allantoic and yolk sac routes, and on the chorioallantoic membrane. Harvesting virus infected membranes and fluids from eggs. Examination of chorioallantoic membrane lesions. Detection of viruses in egg fluids and yolk sac. Conditions for growth in the egg of the main viruses capable of propagation therein. Elementary knowledge of the structures found in the developing egg at different stages in incubation. Disposal of infected eggs.

Tissue Culture Techniques

Preparation of culture and maintenance solutions (Earle's, Hank's lactalbumen hydrolysate, etc.) used for tissue cultures in which viruses are growing or are to be grown. Origin, collection, treatment and use of different kinds of tissues for virus tissue cultures: storage of cell lines. Methods of tissue culture, including roller tubes, plaque methods, micro methods. Uses of trypsin, chelating agents and antibiotics. Special care of apparatus for tissue culture. Use of tissue cultures for primary isolation of viruses. Haemadsorption techniques.

Examination of Specimens

Collection and transport of virological specimens. Methods used in the examination of various types of specimen from patients suffering from virus infections, including cytological methods when these might be of value. Examination of milk, water, air, sewage and other materials which might be concerned in the transmission of infection.

Serological Methods

Methods of performing agglutination, haemagglutination, precipitation, complement fixation, neutralisation and absorption tests, and conditions governing these reactions. Gel diffusion. Fluorescent antibody methods.

Serological Typing of Viruses

Preparation and preservation of reagents used in these tests. A general knowledge of the nature of antigens and antibodies. Preparation of skin test reagents (Frei test).

Microscopy

Care and manipulation of the microscope and its component parts. Types of oculars and objectives. Micrometry. Theory and practice of microscopy, including dark ground illumination and phase contrast microscopy.

Staining Methods

Composition, preparation and use of staining reagents required for the identification and study of viruses (including rickettsia), in films and sections. Fixation. Embedding. Preparation of sections.

Sterilisation and Disinfection

Methods of chemical and physical sterilisation and their uses. Use of disinfectants in virology.

Miscellaneous

Techniques for making permanent preparations of specimens and tissues of virological interest. Principles of purification and concentration of viruses. Dialysis. Methods of preservation of viruses.

Preparation, sterilisation and use of solid and fluid bacteriological culture media for sterility testing.

Laboratory Management

Laboratory planning, air conditioning, dust control and sterilisation of air. Reception and recording of specimens. Cataloguing and indexing. Methods of recording experiments. Maintenance of laboratory records. Storage, handling and disposal of infected, radioactive and dangerous materials. Precautions in the use of virology techniques, ultra-violet radiation and inoculation boxes. Safety measures and emergency treatment for accidents. Housing, feeding and management of healthy and infected laboratory animals including monkeys. Application of the Cruelty to Animals Act (1876). Bleeding mammals and birds. Production and management of mice, including suckling mice.

Apparatus

Knowledge of the construction, maintenance and use of incubator rooms, incubators (bacteriological and egg) refrigerators, cold rooms, dry ice cabinets, waterbaths, ovens, steamers, autoclaves, pumps, stills, ion exchange columns, drying apparatus, blenders, macerators, and different kinds of filter. Care and use of centrifuges, including high-speed and refrigerated models. Care, cleaning and sterilisation of syringes and needles.

SYLLABUS FOR THE FINAL EXAMINATION IN PARASITOLOGY TECHNIQUE (9)

(160 hours)

(Operative from 1st January, 1964)

The syllabus is issued for general guidance and the examination will not necessarily be confined to it. Candidates may be questioned on the APPARATUS and GENERAL sections of the Intermediate syllabus.

Biology of Parasites

An elementary knowledge of the structure, classification and life cycles of:

All protozoa and helminths of medical importance and their intermediate hosts or vectors.

Arthropods and other vectors of important diseases of man. The following parasites of animals: *Trypanosoma lewisi, Eimeria stiedae, Fasciola hepatica, Dipylidium caninum,* larval forms of *Taenia.*

A more detailed knowledge of the following associated with disease in man:

Protozoa. *Plasmodium, Laverania, Toxoplasma, Trypanosoma rhodesiense, Trypanosoma gambiense, Trypanosoma cruzi, Leishmania, Entamoeba histolytica, Entamoeba coli, Lodamoeba buetschlii, Endolimax nana, Giardia, Trichomonas, Chilomastix mesnili, Balantidium.*

Helminths.	*Ancylostama, Necator, Trichostrongylus, Ascaris, Enterobius, Strongyloides, Trichinella, Wuchererio bancrofti* life cycle, the human microfiliariae, *Taenia, Echinococcus granulosus, Hymenolepis, Schistosoma, Clonorchis sinensis, Paragonimus westermani.*
Arthropods.	
Mosquitoes.	Anophelines and Culicines. *Anopheles, Culex, Aedes, Mansonia (Taeniorrhynchus).*
Houseflies.	*Musca domestica.*
Tsetse flies.	*Glossina palpalis* and *G. morsitans.*
Blow flies.	*Chrysomia, Auchmeromyia, Cordylobia.*
Horse flies.	*Chrysops, Tabanus, Haematopota.*
Sandflies.	*Phlebotomus.*
Black flies.	*Simulium.*
Midges.	*Culicoides.*
Fleas.	*Pulex, Xenopsylla, Tunga.*
Bugs.	*Cimex, Triatoma, Rhodnius.*
Lice.	*Pediculus, Phthirus.*
Ticks.	*Ornithodoros moubata, Dermacentor andersoni.*
Mites.	*Sarcoptes, Trombicula.*

Some knowledge will be required of the biology of mosquitoes in relation to the transmission of malaria, filariasis, and virus infections. Emphasis will be placed on the recognition of parasites, and on the spurious parasites of man, saprophytes and parasites occasionally found in man where these are of importance in differential diagnosis. Details of techniques used in laboratory contro' of treatment will be required, but not the medical aspects of treatment or epidemiology.

Identification of Parasites

Collection and preparation of material for parasitological examination. A comprehensive knowledge of the methods of examination of tissue, body fluids and excreta for parasites. Recognition and identification of parasites of medical importance.

Culture Media and Methods

Preparation of culture media in general use in diagnostic parasitology laboratories. Theory and practice of pH determination by colorimetric and glass electrode methods. Isolation and maintenance in culture of strains of protozoa of medical importance. Use of antibiotics. Culture methods for helminth larvae. Maintenance of routine strains of helminths and protozoa by means of laboratory animals. Storage of viable larvae and protozoa. Basic knowledge of maintenance and manipulation of routine strains of such arthropods as are well-known vectors of diseases of medical importance. Elementary knowledge of snail culture. Use of Baermann's apparatus.

Fixation, Staining, Clearing and Mounting

Fixation, staining, clearing and mounting methods used in parasitology laboratories. Histopathology technique as detailed in the Intermediate examination syllabus. Staining of parasites in tissues. Preparation and staining of blood films for the recognition of parasites in the blood, and of faecal smears for the recognition of intestinal protozoa.

Reagents

Composition of fixing, staining, clearing and preserving agents used in the parasitology laboratory. Composition of reagents used in the recovery of protozoa and helminth ova from faeces.

Preservation of Specimens

An elementary knowledge of the preservation and mounting of pathological specimens. Preservation of arthropods, helminths and protozoa for transit and museum purposes. Cataloguing of museum specimens.

Special Techniques

Concentration of parasites in faeces and body fluids. Hatching tests for viability of ova. Detection of embryos and protozoa in vectors. Methods of using a key for the identification of arthopods.

Serology

Principles of the agglutination test, complement fixation test, precipitin test and intradermal reaction, with an elementary knowledge of the preparation of the antigens involved. Formol-gel and allied tests. An elementary knowledge of the 'dye test' (cytoplasm modifying) for toxoplasmosis. Fluorescent antibody methods.

Microscopy

General principles of microscopy. Dark ground illumination. Phase-contrast and fluorescent microscopy. Use of the hot box, warm stage, object marker, stage and eyepiece micrometer.

BACTERIOLOGY AND VIROLOGY (80 hours) (10)

Systematic Bacteriology and Mycology

General principles of methods of identifying micro-organisms. Characteristics identifying each important pathogenic species and the non-pathogenic species of interest in medical bacteriology. Bacteriophage typing. Properties of pathogenic fungi and methods employed in their study.

Systematic Virology

Organisms of the psittacosis group, and rickettsiae: methods of multiplication, pathogenesis of infections caused, modes of spread. General principles of the methods used for the isolation and identification of an unknown micro-organism presumed to be a virus. Particular characters by which it is possible to identify important pathogenic species, particularly those of the pox group, psittacosis group, influenza group, enterovirus group, arthropodborne viruses, adenoviruses, viruses of measles, herpes and rabies, and the rickettsiae.

Serology

A general knowledge of the nature of antigens and antibodies including the antigenic structure of the important pathogens. Principles and methods of performing agglutination, precipitation, complement fixation and absorption tests. Demonstration and estimation of toxins and antitoxins. Fluorescent antibody methods. Gel diffusion.

Serological Typing of Viruses

Methods of performing haemagglutination, neutralisation and absorption tests. Conditions governing these reactions. Preparation and preservation of reagents used in these tests. Preparation of skin test reagents (Frei test).

Antibacterial Drugs

Principles and methods of determining the sensitivity of bacteria. Stability of antibacterial drugs used in these tests. Detection of drug synergism and antagonism. Biological assay of antibiotics and chemotherapeutic agents in body fluids.

GENERAL MICROBIOLOGY (80 hours) (11)

Micro-organisms

Structure, physiology and mode of life of the major groups. Micro-organisms and disease. Micro-organisms in food, food spoilage, water, industry. Structure and reproduction of bacteria and fungi including yeasts. Classification and nomenclature. Microbial structure. Micrometry. Dark ground, phase contrast, fluorescence and electron microscopy.

Bacteria

Growth of bacteria, mathematical analysis. Effects of physical and environmental factors. Radiation. Chemical factors, nutrients, nutrient balance. Major metabolic pathways in bacteria and the use of metabolic processes in the identification of bacteria.

Viruses

Nature, classification, structure, purification and isolation. Pathogenesis. Multiplication and spread. Tissue culture. Bacteriophage.

Protective Mechanisms in the Animal Body

Phagocytosis and immunity. General principles of antibiosis and chemotherapy.

SYLLABUS FOR THE FINAL EXAMINATIONS IN CHEMICAL PATHOLOGY TECHNIQUE (12)

(160 hours)

(Operative from 1st January, 1964)

The syllabus is issued for general guidance and the examination will not necessarily be confined to it. Candidates may be questioned on the APPARATUS, GENERAL and CHEMICAL PATHOLOGY sections of the Intermediate syllabus. Candidates should have completed a course in chemistry to the standard of the General Certificate of Education at Advanced level.

General Chemistry

Structure of matter, nuclear theory of the atom, isotopes, radioactivity. Simple electronic theory of valency. Ionic theory. Gas laws. Acids, bases, oxidation, reduction. Law of mass action, solubility product, salt hydrolysis, pK and pH, buffer solutions, indicators. Properties of solutions, surface tension, osmosis, osmotic pressure, colloids, dialysis, action of molecular sieves, ion exchange, adsorption.

Elementary Organic Chemistry and Biochemistry

Organic chemistry with special reference to the functional groups of alcohols, aldehydes, ketones, carboxylic acids, amines, amides. Properties of lipids, carbohydrates and proteins, and products of their hydrolysis. Nucleic acids. Porphyrins, haemoglobins, related compounds and derivatives. Vitamins. Steroids of biochemical importance and their urinary excretory products. Hormones of the adrenal, thyroid and gonads. Enzymes and enzyme action.

Theory of Techniques

Basic principles of volumetric analysis. Chromatography, including ion-exchange, adsorption, partition, gas-liquid. Electrophoresis, including moving boundary, zone. Ultrafiltration, ultracentrifugation. Electrochemical analysis: potentiometric, conductometric, coulometric, amperometric and polarographic. Absorptiometric analysis using ultra-violet, visible and near infra-red radiation. Fluorimetric analysis. Flame emission and absorption analysis. Gasometric analysis. Diffusion analysis. Automated analysis.

Chemical Pathology Methods

Analytical procedures for the following in biological materials: pH, sodium, potassium, calcium, magnesium, chloride, bicarbonate, carbon dioxide, phosphate, glucose, galactose, aminoacids, proteins, urea, uric acid, creatine, creatinine, alcohol, barbiturates, bromide, salicylates, sulphonamides. Estimation in blood of oxygen, carbon monoxide, iron, copper, lipid and ester phosphorus, protein bound iodine, bilirubin, cholesterol, pyruvic acid, common enzymes, vitamin A. Empirical tests for proteins. Estimation in urine of lead, mercury, ascorbic acid, 17-oxosteroids, 17-hydroxycorticosteroids, noradrenalin and adrenalin and their metabolites. Detection in urine of proteins, sugars and reducing substances, adnormal metabolites, pigments, dyes. Examination of gastric and intestinal contents. Microscopic examination of urine and faeces. Analysis of calculi and concretions. Estimation in faeces of fat, urobilinogen, nitrogen and trypsin.

Function Tests (including procedures in the ward)

Kidney: urine concentration and dilution tests, urea and creatinine clearance tests.
Liver: bromsulphthalein test.
Adrenal cortex: urinary steroid excretion, cortical stimulation and depression, water excretion tests.
Thyroid: basal metabolic rate, radioactive iodine tests.
Pancreas: secretin and pancreozymin stimulation tests, sweat tests, glucose tolerance tests, insulin sensitivity, adrenalin stimulation tests.
Gastric function tests: measurement of hydrochloric acid secretion, histamine and augmented histomine tests, tubeless test meal, night secretion test.
Intestinal absorption tests: xylose absorption test, vitamin A absorption test.
Congo red test for amyloidosis.

Statistics

Distribution, means, mode, median, variance, standard deviation, standard error, correlation.

Laboratory

Maintenance of laboratory records. Organisation and operation of a system of quality control. Laboratory planning. Selection and storage of chemicals, materials and apparatus. Storage, handling and disposal of infected, radioactive and dangerous materials. Safety measures and emergency treatment for accidents. Housing and management of laboratory animals. Application of the Cruelty to Animals Act (1876).

Apparatus

Principles of construction, action, use and care of apparatus (a detailed knowledge of electronics is not required). Selection of glassware, calibration of volumetric apparatus.

CHEMICAL PATHOLOGY (80 hours) (13)

Body Fluids

Extra- and intracellular fluids, distribution of anions and cations. Principles used in the determination of volume of compartments.

Blood

Major constituents, plasma proteins, serum enzymes. Starling hypothesis. Origin of plasma proteins. Haemoglobin, biochemistry of haemoglobin and related pigments. Anticoagulants.

Respiratory Biochemistry

Gaseous levels in arterial and venous blood and principles used in their determination. Analysis of respiratory gases. The transport of O_2, N_2, CO_2 and other gases. Acid-base balance.

Erythrocyte

Ionic equilibria and conditions affecting them. Haemolysis and related phenomena. Life span of the R.B.C. Bile pigments, their formation and excretion.

Cerebrospinal Fluid

Formation and major characteristics.

Renal Function

The kidneys as regulators of the volume and composition of the extra-cellular fluid. Quantitative aspects of renal function: clearance, G.F.R., Tm, R.P.F. Regulation of renal function.

Metabolic Processes

Digestion biochemistry. Gastric secretion and tests of gastric function. Intestinal and pancreatic secretion. The liver: physiology, secretion of bile, detoxication mechanisms, tests of hepatic function, intestinal absorption mechanisms. Principal pathways of metabolism in man and their control by the endocrine system (insulin, glucagon, anterior lobe, adrenal cortex). Basis of tests of metabolic function. Quantitative metabolism, B.M.R.

Biochemical Activity of Secretions of the Endocrine System

Hormone detoxication and excretion mechanisms.

BIOCHEMICAL PHYSIOLOGY (80 hours) (14)

Transformation of Energy in Living Tissues

Circulation of energy in the biosphere. Basic thermodynamic concepts. ΔG and the feasibility of metabolic sequences. Primary features of oxidation-reduction reactions in metabolism. Energy transformation. Co-enzyme systems. Biosynthesis. Use of isotopes in biochemical investigations. Glycolysis, citrate cycle and other metabolic pathways. Fatty acid and glyceride pathways. Steroid synthesis. Nutritional aspects of nitrogen metabolism. Pathways in amino-acid metabolism. Detoxication mechanisms. Antimetabolites.

Biochemical Cytology

Major subcellular particles, their isolation and identifiable biochemical activities. Nucleoproteins and protein synthesis. The cell membrane, transfer processes, membrane potential. Secretion.

Mammalian Biochemical Physiology

Homeostatic mechanisms in the mammal with particular reference to the circulation of body fluids, and the control and regulation of metabolic processes.

PHYSICAL AND ORGANIC BIOCHEMISTRY (160 hours) (15)

Atomic Structure

Atomic theory, isotopes, radioactivity

Molecular Structure

Hydrogen bond. Isomerism, resonance, dipole moments. General concept of the chemical bond. Group transfer potential and the high energy phosphate bond of metabolism. Co-ordination compounds. Molecular structure and biological activity.

Spectroscopy

Absorption and emission spectra, fluorescence.

Properties of Solutions

Solubility and gaseous solubility. Effects of solute on vapour pressure and related properties. Osmosis. Surface tension. Distribution between immiscible solvents. Partition coefficient. Partition chromatography.

Electrolytic Dissociation

Electrolytic dissociation and the mass law. Activity coefficients and ionic strength. Ostwald's dilution law. Conductance. Principles of conductometric, coulometric, amperometric and polarographic analysis.

Acids and Bases

Bronsted and Lowry. Hydrogen electrode. pH. Strengths of acids and bases. Hydrolysis of salts. Dissociation of weak acids. Buffer systems. Buffer pH and buffer capacity. Henderson Hasselbalch equation and relationship to acid-base balance. Titration curves of acids and bases. Ampholytes. Principles of the determination of pH.

Electrochemical Cells, Oxidation and Reduction

Electrode processes. Standard electrode potentials. Hydrogen, calomel and glass electrodes. Electrochemical series. Oxidation and reduction. Redox potential. Potentiometric titration. The potential of organic systems. Redox indicators. Oxidation-reduction potential in biological oxidation mechanisms.

Colloids

Classification and properties. Electrophoresis, electrosmosis, flow potential, zeta potential. Dialysis, molecular sieves, ultrafiltration, ultra-centrifugation.

Surface Chemistry

Adsorption. Adsorption isotherm. Ion exchange. Adsorption and liquid interfaces. Orientation and reactions at surface films. Surface active compounds. Adsorption chromatography. Gas chromatography. Ion exchange.

Chemical Reaction

Mass law, equilibria, reaction rate, order of reaction, specific reaction rate. Collision theory, introduction to homolytic reactions, photochemical reactions, chain reactions. Homogeneous and heterogeneous catalysis.

Kinetics of Enzyme Activity

Michaelis Menten. Theories of enzyme action, active sites. Co-enzymes and activators. Specificity and the action of inhibitors. Isoenzymes. Principles of quantitative enzyme assay.

Analytical Principles

Micro- and ultramicro-analysis. Gasometric analysis. Van Slyke, Warburg and related principles. The general features of the programme and control of automated analytical systems.

General Organic Chemistry

The general properties of aliphatic and aromatic compounds. Benzene. Heterocyclic compounds. Furan and pyran, pyrrole, pyridine, pyrimidine.

Carbohydrate Chemistry

Structural chemistry of glucose and related hexose sugars. Di- and polysaccharide structure of polysaccharide by chemical, enzymic and chromatographic analysis. Uronic acids. Ascorbic acid.

Lipid Chemistry

Simple and compound lipids, their fatty acids, physical and chemical properties. Phospholipids, cerebrosides, galactolipids, lipoprotein complexes. Physical and chemical principles used in the analysis of lipids and related compounds.

Amino-acids and Proteins

Classification of amino-acids, origin and natural sources. Physical and chemical properties of amino-acids. Specific reactions of amino-acids. Physical properties and structural features of protein molecules. Methods used in the analysis of protein molecular structure. Types of proteins including nucleoproteins, their biological, physical and chemical properties.

Steroids and Steroid Hormones

Derivation and chemical characteristics. Oestrogen, androgens, cortico-steroids, progesterone, bile acids, cholesterol.

Other Hormones

Adrenal, thyroid.

Vitamins

Instrumentation Techniques

Application of the foregoing to the principles of instrumental analytical techniques in biochemistry and chemical pathology.

Chapter Three

Occupational Therapy

The Field Defined

Occupational therapy is a form of treatment concerned with the rehabilitation of patients suffering from mental and/or physical illness. The principles of the field are derived from an understanding of the causes and symptoms of disease, the fundamental needs of the individual, and the way in which man functions within his environment.

Occupational therapy began to develop as a profession in the United Kingdom in the early twentieth century as a means of contributing to the psychological, physical, and social rehabilitation of patients with temporary or permanent handicaps. Today, occupational therapists function as members of treatment teams in a wide variety of settings where work and general performance can be assessed, and patients can be helped to achieve their highest possible level of physical, mental, social, and economic independence.

The first school of occupational therapy was opened in England in 1930. However, the development of occupational therapy as a professional field of training has followed a different course in the United Kingdom from similar professional training programs in the United States. Occupational therapy training programs in the United Kingdom are generally hospital-based programs that have developed outside of academic settings and lead to a qualification or diploma awarded by an autonomous professional association, i.e., the Diploma of the College of Occupational Therapists. In contrast, occupational therapy training programs in the United States are affiliated with academic institutions and the basic American professional qualification in this field is an academic certificate or degree, e.g. the bachelor's degree, the master's degree, a post-bachelor's degree certificate, etc.

Professional Bodies

Shortly after 1930, the Scottish Association of Occupational Therapists and the Association of Occupational Therapists in England were formed for the purpose of functioning as professional associations and examining bodies. In 1974, these two associations merged and became the British Association of Occupational Therapists (BAOT), which represents the interests of the

profession throughout the United Kingdom of England, Wales, Scotland, and Northern Ireland. However, since June 1, 1978, the BAOT has placed its trade union/professional functions and its educational/examining functions under two separate organizations which are generally referred to as "chartered companies." The British Association of Occupational Therapists now performs the trade union or professional functions of the Association, and the College of Occupational Therapists, a subsidiary company of the BAOT, performs the educational and examining functions of the Association. The College is currently the only examining body in this field in the United Kingdom that is recognized by the Occupational Therapists Board of the Council for Professions Supplementary to Medicine (CPSM),[1] and the College's diploma is the only recognized basic professional occupational therapy qualification awarded in the United Kingdom.

In a sense, professional associations such as the BAOT/College of Occupational Therapists and the pertinent Boards of the CPSM combine the functions of state licensing agencies, academic institutions, and professional associations in the United States. Under the umbrella of the CPSM, the Occupational Therapists Board directly influences the development and practice of the profession of occupational therapy, and establishes registration requirements. There is often considerable overlap of membership and definition of role among the professional bodies in occupational therapy. This overlap results in close collaboration between the BAOT, the College, and the Occupational Therapists Board, and a dovetailing of functions and interests which is best reflected in the methods for approving training programs. Although the Occupational Therapists Board has the statutory authority to make independent recommendations to the CPSM concerning the approval or disapproval of training programs, these recommendations are presently made only in consultation with the College of Occupational Therapists. Joint site-visits and evaluation meetings are conducted by representatives of both organizations before a decision is reached on a request for approval of a program. In effect, the Board and the College are jointly responsible for the approval of all training programs in the United Kingdom as well as for the maintenance of high standards of professional practice.

Success on the qualifying examinations of the College of Occupational Therapists makes one eligible for registration with the Occupational Therapists Board of the CPSM. Such registration is compulsory for those employed as occupational therapists in the National Health Service, and although registration is not compulsory for those who wish to practice privately, it is a criminal offense for a therapist to use the term "state registered" if her/his name is not on the registry of the CPSM. It should be noted, however, that it would be very unusual to find anyone who is not state registered working as an occupational therapist. Usually, persons who are state registered will also hold a diploma from the College, although it is possible for someone to be registered as an occupational therapist without possessing the College's diploma. This situation occurs when someone earns profes-

1. The CPSM is described in Chapter One, "Up-Front Glossary."

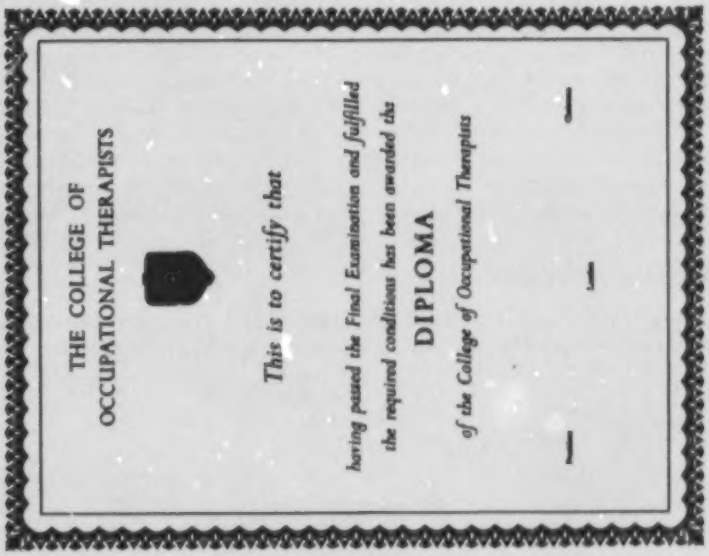
sional qualifications outside of the United Kingdom. Such persons may be registered if the institution from which they have graduated is shown to have acceptable standards, and if they pass an interview/examination conducted by a committee of the Occupational Therapists Board. The purpose of this interview/oral examination is to determine the applicant's ability to communicate, to detect limitations in the applicant's basic training, and to assess the nature and scope of clinical experience.

Professional Qualifications

In the United Kingdom, the basic professional qualification in occupational therapy is the Diploma of the College of Occupational Therapists which is awarded after completion of an approved program and success on the required diploma examinations. (See Document 2.) The holder of this diploma is entitled to membership in the BAOT (MBAOT) and to state registration with the CPSM as an occupational therapist (SROT).

Advanced professional qualifications in occupational therapy include the Advanced Clinical Supervisor's Certificate, the Teaching Diploma in Occupational Therapy (T. Dip), and the Fellowship of the British Association of Occupational Therapists (FBAOT).

Occupational Therapy Aide/Helper. In addition to the professional qualifications noted above, there is an employment category of occupational


THE COLLEGE OF
OCCUPATIONAL THERAPISTS

This is to certify that

having passed the Final Examination and fulfilled the required conditions has been awarded the

DIPLOMA

of the College of Occupational Therapists

Document No. 2

therapy aide/helper. These individuals work under the supervision of qualified occupational therapists and are eligible to become associate members of the BAOT. However, no procedures or requirements have been established for the training or registration of such persons by either the BAOT or CPSM, and there are currently no formal training programs for occupational therapy aides/helpers. Such employees receive only informal on-the-job training from their immediate supervisors. It should be emphasized that, although persons with the title of occupational therapy aide/helper may possess highly developed clinical skills in a particular area, they do not have training comparable to that of graduates of occupational therapy assistants' training programs in the United States.

Currently, however, there is some discussion within the profession concerning the development of a pilot training program at Essex Hospital. Under this program a small group of occupational therapy aides/helpers with superior clinical skills would be selected to complete the didactic and clinical portions of the standard diploma syllabus (approved by the College of Occupational Therapists) over a four- or five-year period while working part-time. Those individuals successfully completing the program would be permitted to sit for the diploma examinations, and would eventually become full members of the professional association.

Basic Professional Training Program

In contrast to degree or certificate programs in the United States, where institutional policy usually determines entrance requirements, curriculum content, and examination or assessment procedures, training programs in the United Kingdom must adhere to the requirements and procedures established by the professional association and the Occupational Therapists Board. Training programs must currently follow the College of Occupational Therapists' standard syllabus and administer its series of three external exams given after completion of specific sections of the syllabus. There are presently 15 programs in the United Kingdom approved by the College of Occupational Therapists. (The programs are listed in Appendix B.)

Entry Requirements

The current minimum requirements for admission to a basic diploma course, established by the College of Occupational Therapists, are as follows:

1. Six General Certificate of Education (GCE) subjects, one of which should be at Advanced or A level. (Only grades A to C are acceptable for Ordinary or O-level subjects taken since 1975.)

   or

   Six Scottish Certificate of Education (SCE) subjects of which three must be at a Higher Grade.

   (It is required that all students have a broad general educational background reflected by a good distribution of O levels or the equivalent,

including passes in English language and other academic subjects, e.g., mathematics, chemistry.)

2. Minimum age of 18 in England and 17 in Scotland.

3. A personal interview to determine personal integrity, initiative and enterprise, tact and sound judgement; organizational and executive ability; and an interest in people and medico-social problems.

Minimum entrance requirements as established by the College and the Board must always be satisfied. However, additional requirements, which vary somewhat from one institution to another, have been established by individual program directors (see Appendix B). A review of the additional requirements of certain programs indicates that frequently at least one or two A levels are required, and it is recommended that these include a science subject, preferably biology. The imposition of the A-level requirement and the strong recommendation of a science subject are a reflection of the attitude of many occupational therapy teachers that students without A levels or the equivalent in biology and other science subjects experience academic difficulty in the basic science subjects. However, the College of Occupational Therapists is reluctant to raise its minimum standards for fear of excluding students who might lack certain academic credentials but who are otherwise highly qualified and motivated.

Within the past few years, the minimum requirements, as well as the additional ones established by particular programs, have frequently been exceeded by selected students. This phenomenon is largely the result of increased competition for a small number of first-year seats, caused, at least in part, by economic pressures that are forcing students to seek practical or professional skills as opposed to less marketable academic degrees. It has therefore become increasingly common for those selected for entry into the basic diploma program to have at least two A levels and possibly more. In the opinion of many, this places the de facto entrance qualifications of students in these programs on a par with those of individuals selected for admission into first-degree programs in academic institutions in the United Kingdom.

Applications for admission to the basic diploma program are also occasionally submitted by individuals who already hold professional or academic qualifications in related fields (e.g., physiotherapy, nursing, or degrees in subjects such as psychology or anatomy). Some training concessions may be granted to certain applicants, but these vary; there are no generally accepted criteria for determining the award of advanced-standing credit, especially in the didactic phase of the basic program. However, holders of certain degrees such as a bachelor's degree in psychology or in anatomy and/or physiology would possibly gain exemption from those parts of the syllabus. With few exceptions, all requests for exemptions must be submitted to the Board of Studies of the College of Occupational Therapists, and in many cases the applicant will be asked to sit for the relevant examina-

tions. Certain exemptions in the clinical experience component of the syllabus may also be granted to individuals holding special qualifications obtained in the United Kingdom. The following exemptions in clinical experience may be made at the discretion of school directors:

—Physiotherapists holding the Diploma of the Chartered Society of Physiotherapy may be exempt from 200 hours in hospitals specializing in the treatment of physical disabilities.

—State Registered (General) Nurses may be exempt from 200 hours in hospitals specializing in the treatment of physical disabilities.

—State Registered Mental Nurses may be exempt from 200 hours in hospitals specializing in the treatment of psychiatric disabilities.

—State Registered Nurses in Mental Subnormality may be exempt from 200 hours in hospitals specializing in the treatment of psychiatric disabilities.

Overseas students who wish to apply for admission to an approved program must hold a certificate which would admit them to a comparable postsecondary course of study in their own country and must present qualifications which are recognized as being equivalent to those required of applicants from the United Kingdom. However, for various reasons, the number of foreign applicants is not large, although occasionally there are a few applicants from Scandinavia and West Africa. The educational credentials of all foreign applicants are reviewed through the professional association's clearing house application system and also by the director of the individual program.

Course of Study

Occupational therapy students undertake a three-year course of theoretical and practical study which at present prepares them for the external examinations of the College of Occupational Therapists. The stated basic objective of this course is to train professional occupational therapists who will function as integral members of a rehabilitation team composed of doctors, nurses, physiotherapists, and others. The three-year training program begins with an orientation course in which the role of the occupational therapist as a member of the treatment team is emphasized; practical experience in group dynamics is provided; the implications of varied social environments are discussed; opportunities for clinical observation are provided; and techniques for handling tools and materials are considered.

Instruction in the basic diploma course is provided in the six general areas of study noted in Column I of Table 19; these study areas cover the specific subjects listed in Column II.

Approximately two-thirds of the course is actually spent in the school conducting the training program, and approximately one-third is spent working in a variety of clinical situations. Table 20 describes the theoretical, practical, and clinical components which make up each year of the three-year program.

Table 19

Basic Diploma Course of the College of Occupational Therapists

Column I—Areas of Study	Column II—Specific Subjects*
(A) The Body and Mind in Normal Health	Anatomy and Physiology, Psychology.
(B) Deviations from Health by Deficiency, Disease or Trauma	Medicine and Surgery, Psychiatry.
(C) Occupational Therapy for Medical, Surgical and Psychiatric Disabilities	Principles of pathology, methods of treatment and prevention of disease, locomotor system, neurological conditions, medical conditions, psychiatric conditions.
(D) Communication and Management	Structure and function of statutory and other organizations, departmental organization, patient's records, stock control and bookkeeping.
(E) Practical Skills	Management of patients, use of equipment for treatment, basic techniques of self-care and independence, work and craft activities, group activities, domestic activities, basic splintage.
(F) Clinical Experience	Clinical work in hospitals, rehabilitation centers, and with the domiciliary services. (Students are assigned to different centers for practical experience.)

AUTHOR'S NOTE: Although most of this material was taken from the syllabus published by the British Association of Occupational Therapists, some of the information was gathered on a research trip to Great Britain.

*Detailed information concerning the content of specific subjects may be obtained in Appendix C.

The content of each course taught in an approved program must conform to the approved syllabus of training established by the College of Occupational Therapists and published in the BAOT *Manual for the Diploma Course and Examination* (see Appendix C). Conformity with these requirements is currently assured by the external examinations that are also developed and administered by the College. It should be noted, however, that even though there is an accepted standardized syllabus and an external examination procedure, teaching methods and actual contact hours for various parts of the syllabus vary markedly from one school to another. For example, one school of occupational therapy may emphasize, and even require, a considerable amount of instruction in psychology and group dynamics, while another may require little formal instruction in psychology and no work in group dynamics.

Frequently, the basic science subjects and clinical subjects as taught in

Table 20

Theoretical, Practical, and Clinical Components of Three-Year Program of the College of Occupational Therapists (1978)

	First Year	*Second Year*	*Third Year**
Theory:	Occupational Therapy Anatomy & Physiology Psychology Sociology	Occupational Therapy Medicine & Neurology Surgery/Orthopaedics Psychiatry	Incorporated into clinical phase.
Practice:	Applied Occupational Therapy Woodwork Art & Pottery Movement, Music, Recreation Commercial Course Home Economics Gardening	Applied Occupational Therapy Splint Making Work & Industry Weaving Printing Drama Elective	Incorporated into clinical phase.
		Second and Third Years	
Clinical Experience:	Visits to Occupational Therapy Departments	Four placements of 6-10 weeks each in the following settings or the equivalent: general hospital, psychiatric hospital, geriatric unit, community clinic, elective placement.	

*The last term of the third year also includes 10 modules on various aspects of occupational therapy conducted by special lecturers at the institution concerned.

particular professions in the United Kingdom reflect very closely the orientation and needs of that profession as perceived by those responsible for a given program. For example, anatomy and physiology as taught to occupational therapy students may be quite different from that which is taught to physiotherapy students, and both programs may be considerably different from the anatomy and physiology studied by medical students. The usual procedure in the United Kingdom is for an occupational therapist to teach the basic sciences to occupational therapy students, a physiotherapist to teach these subjects to physiotherapy students, and an anatomist to instruct medical students, even though special guest lecturers may frequently teach selected topics to each of these groups. Although at present some attempts are being made to consolidate instructional resources and course content between professions with similar core courses, consolidation is not yet widespread. A good example of an attempt at combined coursework is a program currently involving the London School of Occupational Therapy, St. Mary's School of Physiotherapy, and Central London Polytechnic in which the students from the three institutions all attend the same basic science courses, which are taught at the Polytechnic in the Department of

Life Sciences. However, even in this case, the individual occupational therapy program provides additional instruction in those subject areas oriented towards that profession.

Before students are admitted to the final examination of the College, they must have fulfilled all the requirements of the clinical experience component. The requirements of this component are usually completed during the second and third year of the program and amount to 1,200 or more contact hours of clinical experience distributed as follows:

—400 hours in hospitals specializing in the treatment of physical disabilities: This experience must include the treatment of patients suffering from physical injury and disease in both acute and chronic phases and practice in a general hospital.

—400 hours in hospitals specializing in the treatment of psychiatric disabilities: This experience must include treatment of patients suffering from neurosis and psychosis in both acute and chronic states, and practice in a National Health Service psychiatric hospital.

—A further 400 hours in either or both of the above fields or in one allied to them.

However, in actuality, the clinical experience of many students exceeds 1,400 contact hours, and a given individual's clinical affiliations may include such fields as geriatrics, orthopedics, psychiatry, general medicine, and amputation.

Examinations

The first three months in any program are generally considered probationary, and during this period each school reserves the right to ask students to leave if their standard of work, conduct, or character do not meet accepted standards of the profession. Continued student progress throughout the three-year program is periodically assessed by internal examinations and, in addition, all students must pass the external qualifying examinations of the College of Occupational Therapists (see Appendix C). These qualifying examinations consist of a series of three groups composed of various parts. Each of these examinations must be satisfactorily completed before the student proceeds to the next phase. The structure and general content of the examinations are as follows:

Group I (consists of two parts):

(1) Anatomy & Physiology;

(2) Psychology.

These subjects are normally examined at the end of 12 months' training and must be passed before admission to the final examination.

Group II (consists of two parts):

(1) Medical and Surgical Conditions Treated by Occupational Therapy;

(2) Psychiatry.

These subjects are examined after Group I and after a minimum of three months' clinical experience in the relevant field.

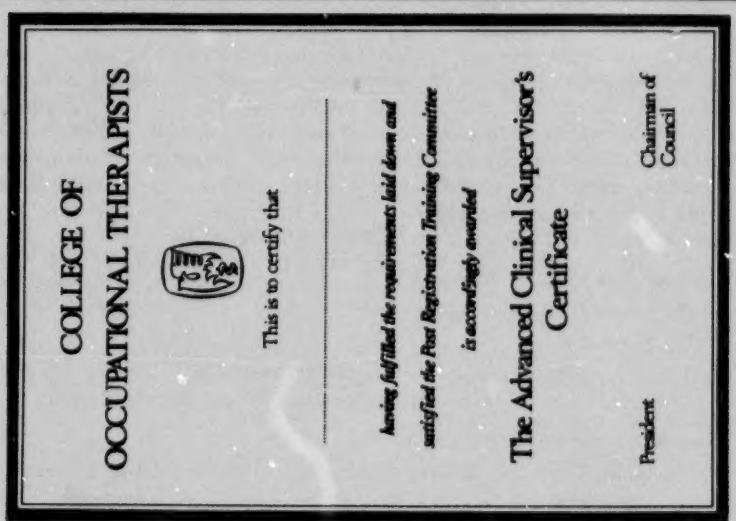
Group III or the Final Examination covers:

(1) Functional Anatomy Skills used in Occupational Therapy;
(2) Occupational Therapy for Patients with Medical and Surgical Disorders;
(3) Occupational Therapy for Psychiatric Disorders and Mental Subnormality;
(4) Communication and Management.

Before a student may sit for each part of the professional association examination, evidence of having completed the required subjects must be provided to the principal of the school. Permission to sit for the various parts of the professional examinations or to proceed to the next level of training may be refused if school authorities are not satisfied that all course requirements for a session have been satisfactorily completed.

Advanced Programs of Study

In addition to the basic professional training program, there are also advanced professional training programs in occupational therapy. These advanced training programs lead to special professional qualifications awarded by the College of Occupational Therapists and the BAOT, i.e., the Advanced Clinical Supervisors Certificate, the Teaching Diploma in Occupational Therapy, and the Fellowship of the BAOT.


COLLEGE OF
OCCUPATIONAL THERAPISTS

This is to certify that

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having fulfilled the requirements laid down and satisfied the Post Registration Training Committee is accordingly awarded

The Advanced Clinical Supervisor's Certificate

President

Chairman of Council

Document No. 3

Advanced Clinical Supervisor's Certificate

The Advanced Clinical Supervisor's Certificate (see Document 3) is intended to have a dual function: to promote competence in student training/supervision and to serve as a possible introduction to other advanced qualifications, e.g., the Teaching Diploma, or the Fellowship. The course leading to this certificate is open only to persons actually supervising students doing clinical work and is conducted through correspondence with a representative of the College of Occupational Therapists. Generally, the requirements for the certificate can be completed in two years or less.

Teaching Diploma of the College of Occupational Therapists

The Teaching Diploma of the College of Occupational Therapists (T.Dip.) is awarded to teachers of occupational therapy who can satisfy the Teacher Training Committee of the College of Occupational Therapists that they have reached a prescribed standard of proficiency in the theory and practice of teaching as it is related to occupational therapy. In order to obtain the Teaching Diploma, candidates complete one of the full- or part-time courses approved by the College of Occupational Therapists and the Occupational Therapists Board in one of the technical colleges of education. Completion of an approved course leads to both the Teaching Diploma and the Certificate of Education. It is important to note, however, that the Certificate of Education is awarded by the college of education, and the Teaching Diploma by the College of Occupational Therapists. Colleges of education currently offering approved full-time courses are listed below.

Bolton College of Technology
Bolton, England

Garnett College
London, England

Ulster College
Newtownabbey, North Ireland

Huddersfield Polytechnic
Huddersfield, England

Jordanhill College of Education
Glasgow, Scotland

University of Wales
Cardiff, Wales

Wolverhampton College of Further Education
Wolverhampton, England

During the student's program, the College of Occupational Therapists is represented by a professional assessor who works closely with the student and the educational institution to assure that the student has adequate professional knowledge and an understanding of occupational therapy teaching.

The full-time course usually lasts for four terms, and each term consists of eight to ten weeks. Two alternate terms are spent at the educational institution, and the other two are spent in supervised teaching at an approved occupational therapy school. The didactic portion of the course

includes instruction in educational philosophy, learning theory, sociology as it relates to education, teaching methods, and classroom observation. Some of these subjects are similar to those in American teacher education programs. The subject descriptions in Appendix D of Chapter Four (Physiotherapy) indicate some of the education subjects taught in the didactic portion of a Teaching Diploma course.

The part-time course leading to the Teaching Diploma is similar in content to the full-time course but is spread over a longer period of time, usually six part-time terms rather than four full-time terms and is intended for persons who wish to pursue a course of study while employed. Garnett College, Huddersfield Polytechnic, and Wolverhampton College currently offer both part-time and full-time Teaching Diploma courses, while the other colleges offer only full-time programs.

In addition to the full-time and part-time courses at colleges of education, the Teaching Diploma may also be obtained by pursuing a modular approach outside of colleges of education. Candidates following this route to the Teaching Diploma must complete a pedagogic module (including educational theory and practice teaching) and a professional module, both of which must be approved by the Teacher Training Committee of the College of Occupational Therapy. However, recent trends indicate that potential teachers are now choosing either a full- or part-time course of study at a college of education rather than the modular approach. This trend may

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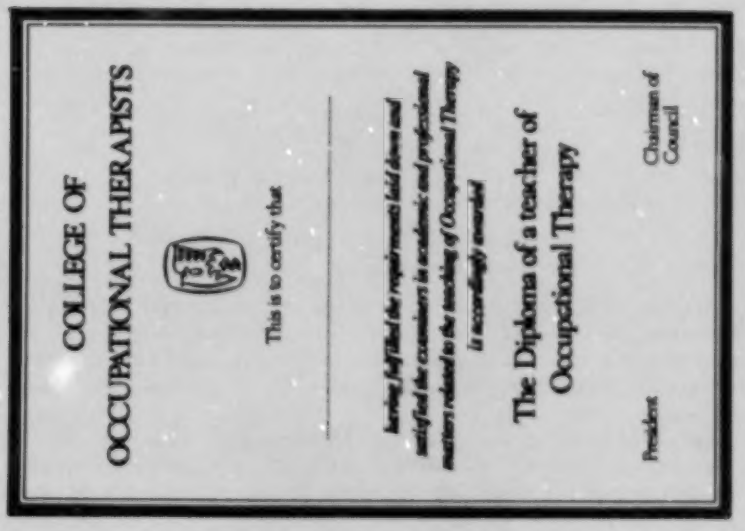

COLLEGE OF
OCCUPATIONAL THERAPISTS

This is to certify that

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having fulfilled the requirements laid down and satisfied the examiners in academic and professional matters related to the teaching of Occupational Therapy is accordingly awarded

The Diploma of a teacher of Occupational Therapy

President

Chairman of Council

Document No. 4

be the result of the fact that the National Health Service and most other employers do not accept a Teaching Diploma obtained via the modular route as the equivalent of a Teaching Diploma obtained by attending a college of education. These reservations are based on the assumption that the didactic component of the pedagogic module, which is usually completed through the City and Guilds of London, is not comparable, in terms of depth or length of study, to the didactic component of a course completed at a college of education. (See Document 4.)

Fellowship Status With the BAOT (FBAOT)

Fellowship status may be one of two types which, unfortunately, cannot be distinguished by the appearance of the certificate. The first type of fellowship is best described as honorary in nature and is awarded by the BAOT to deserving members for long and meritorious service but does not involve an examination or research project. Currently, 15 therapists hold this type of fellowship. The second category of fellowship, only recently introduced, will be awarded on the basis of a research work or thesis which must be approved by the Fellowship Committee of the College of Occupational Therapists. To date, however, no research fellowship has been awarded, but two individuals are currently working on the required research projects. It is hoped that research leading to this award will contribute significantly to the profession.

Additional Programs of Study

In addition to the advanced professional qualifications noted above, there are various university level programs which culminate in academic awards that are open to graduates of approved diploma courses in occupational therapy. For example, an occupational therapist could obtain a bachelor's degree in one of the social or behavioral sciences through a university or Council for National Academic Awards (CNAA)[2] program. Also, although it is somewhat unusual, occupational therapists may occasionally obtain degrees in related fields; the two fields in which this most often occurs are psychology and sociology, two disciplines of importance to the profession.

It is now also possible for occupational therapists to pursue studies leading to a Diploma in Rehabilitation Studies at the University of Southampton. This recently developed one-year course leads to a diploma through the Faculty of Medicine. Candidates for admission to that faculty must possess a professional qualification with an appropriate Board of the CPSM (e.g., the Occupational Therapists Board) or have acceptable qualifications in another suitable field (e.g., nursing, social work). The course is 12 months in length with lectures, tutorials, seminars, internal examinations, and short-term project work in clinical areas. The syllabus for the Diploma in Rehabilitation Studies is contained in Appendix A.

2. The CNAA is described in Chapter One, "Up-Front Glossary."

Developments in Professional Training

The field of occupational therapy training in the United Kingdom is currently undergoing considerable change. Increasingly, many of these traditionally non-academic/non-degree professional training programs in the United Kingdom are moving into academic or degree-granting settings. Currently, several occupational therapy schools are actually situated in polytechnics (e.g., Salford, Newcastle-upon-Tyne, Ulster) but their professional awards are still under the authority of the College of Occupational Therapy. Members of the BAOT and representatives of the various training programs are presently discussing with the Council for National Academic Awards (CNAA) the possibility of degrees in occupational therapy programs offered at the polytechnics. As a result, it is very likely that degrees of various types may soon be offered in occupational therapy and related fields. A CNAA bachelor's degree in occupational therapy is already being developed at Ulster Polytechnic, where it is expected that (as in the field of physiotherapy) degree and diploma programs will be conducted concurrently. This proposed degree program will be four years in length with the same subject matter content as the three-year diploma course. The extra year, however, will allow for more emphasis on the theoretical aspect of the basic sciences and research methods.

In addition to possible changes in the structure and location of training programs, there may also be changes in the current examination system. Although the present examination system is essentially external, there is increasing sentiment that the on-going assessment of students at various levels should be internalized within each institution and should not be the sole responsibility of the College of Occupational Therapists. It appears possible that within the next few years the current external examination procedures of the College may be modified in such a way that each institution will become responsible for maintaining the standards of the first two years of the program by offering its own internal examinations—and that the College will then have direct responsibility for only the final exam and awarding the diploma.

Summary

Occupational therapy training programs in the United Kingdom occur outside an academic setting and produce highly trained, clinically competent practitioners of a respected profession who usually do not possess academic awards or degrees. This situation frequently presents a problem to admissions officers and licensing authorities in the United States who usually require a bachelor's degree for admission to graduate work or for admission to the appropriate licensing examination. The absence of a four-year bachelor's degree is often interpreted as meaning that the professional qualifications of an individual are less than those of graduates of degree programs in the United States. This view is partly based on two suppositions: (1) Individuals are admitted to basic occupational therapy training programs on the basis of qualifications that are below those required for

admission to basic degree programs in the United States; and (2) their basic professional program lacks many of those subjects which are contained in the first two years of most bachelor's degree programs in the United States, e.g., liberal arts, general studies, basic science theory. The validity of the first of these suppositions is questionable, since most entering students in the United Kingdom now present at least one A-level pass on the GCE—but the second is probably valid.

A comparison of occupational therapy training programs in the United Kingdom and the United States shows that, in general, the two countries take different approaches to the training of practitioners. Probably the most obvious of these is that, as a result of the different settings of the training programs in the two countries, the general studies or liberal arts and elective components of bachelor's degree programs in the United States are lacking in programs in the United Kingdom. Also, occupational therapy programs in the United Kingdom do not usually provide as much instruction in the areas of basic science theory, prevention/early intervention, research, and administration/management as programs in the United States. However, careful attention should be given to the similarities as well as the contrasts of the training programs of the two countries. This approach would help to establish a basic guideline for determining the comparability of the preprofessional and professional components of the program. The only way in which this comparability of particular subjects can be established is by comparing the approved syllabus of a program in the United Kingdom and a statement of specific contact hours with the appropriate American institutional course description.

Guidelines to Accompany Placement Recommendations

Guide to Credentials. Members of professional associations are usually able to submit original certificates of membership, i.e., Membership in the British Association of Occupational Therapists (MBAOT). If a candidate is unable to provide a credential, verification can be obtained by contacting the appropriate professional association directly. Also, although transcripts as known in the United States are not readily available from institutions in the United Kingdom, professional associations can provide information concerning performance on membership examinations and syllabus content. However, information concerning the actual course content and specific contact hours for various parts of the approved syllabus as it is taught at a particular institution can only be obtained by contacting the Principal of that training program. (Addresses for each program are available in Appendix B.)

It is strongly suggested that as much detailed information as possible be obtained about a particular program before any decisions on placement are made because of the wide variety of actual course content and contact hours in the various subjects. It might also be appropriate to request candidates to submit documentation of all other postsecondary, as well as all secondary, study before being placed in a U.S. educational institution.

For information concerning credentials from other types of institutions (e.g., polytechnics, colleges of education, external examining bodies), refer to *United Kingdom*.[3]

Placement Recommendations

The placement recommendations were approved by the National Council on the Evaluation of Foreign Educational Credentials, August 8, 1979. For an explanation of the role of the Council, and a list of Council members, see pp. 181-182.

1. Diploma in Occupational Therapy: Diploma-holders may be considered for undergraduate admission with possible transfer credit which should be carefully considered on a subject-by-subject basis, taking into account the approved syllabus as it is taught at the particular institution and noting carefully the number of contact hours involved. Prior qualifications may yield additional transfer credit. In exceptional cases, consideration may also be given for admission to appropriate graduate programs if it can be determined that the student's overall educational and professional background warrants such consideration. As no claim is being made that this level of education has equality with a U.S. bachelor's degree program, such graduate admission might be limited to those U.S. institutions which will waive the requirement for the degree. In states which require the bachelor's degree for licensing, applicants without a degree should be forewarned that although they may have been deemed eligible for admission into a graduate program, they may not meet some states' requirements for licensure (pp. 88-94).

2. Advanced Clinical Supervisor's Certificate in Occupational Therapy: Certificate-holders should not be considered for academic credit (p. 95).

3. Teaching Diploma in Occupational Therapy and Certificate of Education: Persons holding these credentials may be considered for undergraduate or graduate admission in accordance with Recommendation #1. The work taken for these additional qualifications should yield only undergraduate credit, determined on a subject-by-subject basis, for the education courses completed at a college of education (pp. 95-96).

4. Teaching Diploma in Occupational Therapy (obtained by modular approach): Diploma-holders may be considered for either undergraduate or graduate admission in accordance with Recommendation #1. Limited undergraduate credit for appropriate education courses may be granted after a careful review of the educational component of the individualized program (p. 96).

5. Fellowship in Occupational Therapy (awarded on the basis of distinguished service): Fellowship-holders should not be considered for academic credit (p. 97).

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3. Fisher, p. 217.

6. Fellowship in Occupational Therapy (awarded on the basis of research and thesis): Fellowship-holders may be considered for admission to appropriate graduate programs if it can be determined that overall educational and professional background warrants such action. As no claim is being made that this level of education has equality with a U S. bachelor's degree program, such graduate admission might be limited to those U.S. institutions which will waive the requirement for the degree. In states which require the bachelor's degree for licensing, applicants without a degree should be forewarned that although they may have been deemed eligible for admission into a graduate program, they may not meet some states' requirements for licensure (p. 97).

7. Diploma in Rehabilitation Studies: Diploma-holders may be considered for admission to appropriate graduate programs if they also hold the Diploma in Occupational Therapy (or a comparable qualification in a related field). As no claim is being made that this level of education has equality with a U.S. bachelor's degree program, such graduate admission might be limited to those U.S. institutions which will waive the requirement for the degree. In states which require the bachelor's degree for licensing, applicants without a degree should be forewarned that although they may have been deemed eligible for admission into a graduate program, they may not meet some states' requirements for licensure (p. 97).

8. Bachelor's Degree in Occupational Therapy: Degree-holders may be considered for graduate admission (p. 98).

Appendix A

Syllabus for Diploma in Rehabilitation Studies at University of Southampton

Syllabus

Education and Teaching Media
- Basic principles of teaching and learning
- The use of teaching materials
- Evaluation of learning

Law in Relation to Medicine and the Disabled
- Law and the disabled
- Law and the mentally ill

Management Development
- Recruitment systems and selection interviews
- Communications, effective consultation
- Techniques of redeployment. Budgetary control
- Use of personnel policies
- Professional ethics and organisational development
- Organisational psychology

Medicine—Rehabilitation—Medical Engineering
- Housing and design for the disabled
- Multidisciplinary clinics
- Mental health and psychology
- Geriatric medicine
- Industrial therapy principles
- Medical engineering
- Advances in major specialties requiring rehabilitation services
- Community medicine
- Primary medical care
- Assessment of disability

Quantitative Methods
- Applied statistics
- Operational research
- Research design

Sociology
- Social components of handicap assessment
- Social provisions for the disabled
- Sickness role, stigma and institutionalisation
- Client/professional relationships

During the first eight months formal course work will be interspersed with studies in the field, thus relating therapy to practice. For example, after a period of instruc-

tion in research design students may undertake a short study, during which they will carry out the procedures of a normal research project, excluding data collection.

Field Work

To widen their experience students will undertake field work in some of the following areas:

Coronary care unit
Thoracic unit
Neurological unit
Geriatric unit
Young chronic sick unit
Daily living unit
Workshop
Limb fitting and appliance centre
Psychiatric unit/hospital
Paediatric unit
Spinal injury unit
Sheltered employment
Employment Rehabilitation Centre
Disablement Resettlement Service
Community medicine

Much of this experience will be in Southampton but some will be available in other areas of the Wessex Regional Health Authority.

Project Study

Although the project is administratively allocated to the June-September period it is envisaged that students will become actively involved with their projects at an early stage of the course. Provided that the subject studied falls within the general field covered by the course, the research interests of individual students will be fostered.

Appendix B

List of Programs in the U.K. Approved by the College of Occupational Therapists and Entrance Requirements for Each Program

Aberdeen —The Grampian School of Occupational Therapy, Woolmanhill, Aberdeen AB9 1GS.

Six G.C.E. subjects, two of which should be at 'A' level and include English language, a science subject and arithmetic or mathematics. Or six S.C.E. subjects of which three must be at Higher grade including Higher English. The subjects should include a science subject and arithmetic or mathematics.

Cardiff —The Welsh School of Occupational Therapy, Combined Training Institute, University Hospital of Wales, Heath Park, Cardiff CF4 4XW.

The five 'O' levels must be in academic subjects and include English and biology/or human biology. Academic C.S.E. Grade 1 may be acceptable. In addition, one 'A' level.

Derby —The Derby School of Occupational Therapy, Highfield, 403 Burton Road, Derby DE3 6AN.

The five 'O' levels must be in academic subjects and include English language and a science subject, preferably biology or human biology. Grade 1 C.S.E.'s may be acceptable. At least four subjects must be passed at a sitting. In addition one 'A' level, preferably in English or biology.

Edinburgh —Occupational Therapy Training Centre, Astley Ainslie Hospital, Grange Loan, Edinburgh EH9 2HL.

Candidates must have three Higher grade or two 'A' level passes. Subjects should include (i) English at Higher grade or English language, (ii) a science subject, preferably biology, (iii) mathematics or arithmetic or statistics; alternative evidence of satisfactory attainment in arithmetic may be considered. Preference will be given to candidates who have gained five 'O' grade/level passes at one sitting.

Academic subjects are preferred.

Exeter —St. Loye's School of Occupational Therapy, Millbrook House, Topsham Road, Exeter, Devon EX2 6ES.

No additional educational requirements over minimum specified.

Glasgow —Glasgow School of Occupational Therapy, 29 Sherbrooke Avenue, Glasgow G41 4ER.

G.C.E. candidates should have two passes at 'A' level. S.C.E. candidates must obtain Higher English and include either arithmetic, mathematics or statistics in their group. Preference is given to candidates with a science subject.

Liverpool —The College of Occupational Therapy (Liverpool) Ltd. Victoria Road, Huyton, Liverpool L36 5SB.

Five academic 'O' levels, one of which must be a science subject, and two 'A' levels.

London —The London School of Occupational Therapy, 55 Eton Avenue, London NW3 3ET.

Minimum entry requirements as specified in regulations for admission to training, but must include English and a science subject at 'O' level and preferably English and/or a science subject at 'A' level.

Newcastle —Occupational Therapy Course, Department of Health Studies, Division of Rehabilitation Studies, Newcastle-upon-Tyne Polytechnic, Northern Counties Precinct, Coach Lane, Newcastle-upon-Tyne NE7 7XA.

No additional entry requirements. 'O' level subjects must include English language and a science subject, e.g., human biology.

Northampton —School of Occupational Therapy, St. Andrew's Hospital NN1 5DG.

Minimum entry requirements as specified in regulations for admission to training, but should include English and biology at 'O' level.

Northern Ireland —Division of Occupational Therapy, The Ulster College, Northern Ireland Polytechnic, Jordanstown, Newtonabbey, Co. Antrim, Northern Ireland.

Applicants should have G.C.E. 'O' level passes in six academic subjects, one of which should be at 'A' level. A pass in 'O' level English language is essential and applicants will normally be required to have an 'O' level pass in a science subject. Only grades A to C are acceptable for 'O' level subjects taken since 1975.

Oxford —The Dorset House School of Occupational Therapy, 58 London Road, Headington, Oxford.

Six subjects—two at 'A' level and four at 'O' level or Grade 1 C.S.E. (five of these being academic subjects). A pass in English language and at least three subjects must be passed at one sitting. In exceptional circumstances, consideration may be given to applicants with other equivalent qualifications or experience.

Salford —The School of Occupational Therapy, Salford College of Technology, Frederick Road, Salford, Lancs M6 6PU.

Six different subjects—one at 'A' level, five at 'O' or Grade 1 C.S.E., five of these being academic subjects and to include English language.

Wolverhampton —The School of Occupational Therapy, New Cross Hospital, Wolverhampton WV10 OQp.

Five subjects (four academic) at G.C.E. Ordinary level or Grade 1 C.S.E. and at least one of these subjects taken at G.C.E. Advanced level. All candidates must have a pass in English language at G.C.E. 'O' level or Grade 1 C.S.E.

York —The York School of Occupational Therapy, College of Ripon & York St. John, Lord Mayor's Walk, York YO3 7BX.

Minimum entry requirements as specified in regulations for admission to training, but must include English language and a science subject at 'O' level.

SOURCE: *A Career in Occupational Therapy* (London: British Association of Occupational Therapists, 1977).

Appendix C

Approved Syllabus for Basic Diploma in Occupational Therapy

(Approved by the College of Occupational Therapists as of November 1978)

ANATOMY AND PHYSIOLOGY

The Syllabus is divided into three parts, an Introduction, Section I and Section II. The Introduction covers the essential basic knowledge required before the students embark upon the main Syllabus. Part I deals with those aspects of systematic anatomy and physiology about which a general but not detailed knowledge is required. Part II is concerned with functional anatomy, and is treated from a regional standpoint. This more precise study of topographical anatomy lays emphasis on function and kinesiology. The importance of surface anatomy is to be stressed. It is essential that structure should be correlated with function throughout.

IT IS EXPECTED WHEREVER POSSIBLE THAT SIMPLE DEMONSTRATIONS OF ANATOMICAL AND PHYSIOLOGICAL PHENOMENA SHOULD BE CARRIED OUT BY THE STUDENTS.

INTRODUCTION

(Not to be studied in depth)

A basic knowledge of anatomical terms.

The structure of the cell as revealed by the light and electron microscope.

The properties of tissues of the locomotor system and other bodily systems as revealed by the light microscope.

The histology of epithelial and connective tissues.

The basic chemical processes related to cellular function and metabolism. Enzymes. Calcium metabolism. Osmosis. Diffusion. Electrolyte balance. Hydrostatic pressure. Filtration. Mechanisms of immunity.

I GENERAL ANATOMY AND PHYSIOLOGY

Locomotor System

The general structure, ossification and growth of bones.
The general structure and classification of joints.

The types of muscle attachment, fascicular architecture, and physiology of skeletal muscle.

The histology and function of proprioceptive nerve endings in muscles, tendons and joints.

The general structure of individual bones of the vertebral column and limbs.

Nervous System

The structure and function of motor and sensory nerve fibres. The structure of the neurone.

The general topography and structure of the brain and spinal medulla (spinal cord).

The reflex arc.

The pyramidal and extra-pyramidal pathways.

The sensory pathways for exteroceptive and proprioceptive impulses.

A general knowledge of the cranial nerves.

The general features of spinal and cranial reflexes.

The composition, course and distribution of spinal nerves and limb plexuses.

The characteristics of, and differences between upper motor neurone and lower motor neurone lesions.

The histological features and characteristics of degeneration and regeneration of peripheral nerves.

A general knowledge of the special senses and of proprioception.

The general structure and function of the autonomic nervous system.

The formation and absorption of cerebrospinal fluid.

Cardio-vascular System

The cellular composition and general functions of blood.

The essential structure and innervation of the heart and blood vessels.

General course of the main blood vessels and the circulation of blood through them.

The factors affecting heart rate, stroke volume and arterial blood pressure, and their control.

The influence of posture and exercise on cardiac output.

A general knowledge of the methods of pulse and blood-pressure recording and auscultation of the heart.

The formation and absorption of tissue fluid.

Lymphatic drainage.

Respiratory System

Anatomy and function of the respiratory apparatus, including the thoracic cage and diaphragm.

The structure of the lungs.

Mechanics and control of breathing.

General knowledge of external and internal respiration.

Digestive System

General structure and function of the alimentary tract.

General knowledge of digestion, foodstuffs and metabolic processes.

An understanding of basic nutritional requirements.

Urogenital System

General structure and function of the urinary system.

General understanding of the formation of urine in relation to water balance.

A general understanding of the physiology of reproduction.

Endocrine System

Hormones.

A general knowledge of the location and function of the pituitary, thyroid, parathyroid and suprarenal glands, the pancreas and gonads and their interactions.

A general knowledge of the effects of hormones on bone growth and calcium metabolism.

Physiology of exercise

Acute changes in response to exercise.

Effects of prolonged muscular activity. Exercise tolerance.

The regulation of body temperature.

II FUNCTIONAL ANATOMY

Mechanics of bodily movement

Planes and axes of movement.
Group actions of muscles.

Effects of the pull of gravity; the maintenance of an upright posture.

Methods of assessing range of movement and strength of muscles.

Upper limb

General knowledge of the pectoral girdle, particularly in relation to arm and shoulder movements.

Joints: Shoulder, Elbow, Forearm, Wrist, Hand — Palpable structures and gross anatomy. Relationship of movement to function. Muscle groups acting on the joint. Attachments, nerve supply and relationships of muscles.

Functional use of the hand in terms of placement, grip, release, precision, dexterity and discrimination.

Co-ordination of joints and muscle groups in normal activities.

Composition, course and distribution of peripheral nerves and the effects of lesions of these nerves, especially in relation to loss of function.

Lower limb

General knowledge of the pelvic girdle, particularly in relation to posture and weight bearing.

Joints: Hip, Knee, Ankle — Palpable structures and gross anatomy. Relationship of movement to function. Muscle groups acting on the joint. Attachments, nerve supply and relationships of muscles. General knowledge of the joints and arches of the foot.

Co-ordination of joints and muscle groups in normal activities.

Composition, course and distribution, of peripheral nerves and the effects of lesions of these nerves, especially in relation to loss of function.

Trunk

General knowledge of the intervertebral joints.
Palpable structures.
Movements; action of main muscles.

PSYCHOLOGY

This course is intended to acquaint the student with a body of empirical information and theory concerning psychology relevant to Occupational Therapy.

It is hoped:—

to promote an understanding of the student's own behaviour, and the behaviour of other people.
to provide a knowledge of techniques of behaviour modification in a wide sense—from teaching a skill to conducting a group session with patients.
to encourage the student to understand more fully the factors involved in the use of social skills and personal interactions and relationships.

It is recommended that in addition to lectures and tutorials there should be practical sessions. The application of normal psychology to clinical, educational and industrial fields should be studied.

The background of behaviour

Culture, including environmental influences and social class.

Heredity.

Maturation.

The development of personality and behaviour

Childhood: emotional, intellectual and moral development of the child. The importance of play and school.

Adolescence: mental and physical changes. Possible stress situations.

Adulthood: criteria of maturity. Importance of work. Marriage, parenthood and other responsibilities. Psychological changes of middle age. The effects of old age: physical, mental and social changes.

Cognitive processes

Learning: types of learning; factors that promote efficient learning and their influence upon teaching. Conditioning techniques; application to behavior modification.

Memory: short and long term memory. Effects of age.

Perception: its development, personal and social determinants. Thinking and reasoning; styles of thinking; illusions.

Personality, motivation and emotion

Physiological effect of emotion.

Conscious and unconscious motivations: defence mechanisms and resulting behaviour patterns.

Personality: theories of personality, techniques of assessment.

Intelligence: definitions, techniques of measurement, reliability and validity of tests.

Social groups and social interaction

Social behaviour of the individual. Variables operating in the interview situation.

Development and analysis of social skills, judgement of personality.

Attitudes: definition and measurement, prejudice.

Community social behaviour: types of group, variables in normal group situations, structure and environment, task, role, leadership, morale, communication, stereotypes, assessment of group interaction.

Assessment tests and experimental concepts

Assessment tests for use by occupational therapists. The value of experimental data, definitions of simple statistical terms.

MEDICAL AND SURGICAL CONDITIONS TREATED BY OCCUPATIONAL THERAPY

The student is required to have a general understanding of the pathology of disease and a particular knowledge of the clinical conditions most likely to be treated by the occupational therapist.

General principles of Pathology

The nature of health and disease, deviation from the normal state of health and the individual's reactions to this.

Classification of the causes of disease: congenital and hereditary, traumatic, infective, metabolic, postural, degenerative, neoplastic, psychosomatic, idiopathic.

Pathological changes in the structure of the cell in disease.

General pathological reaction of the body to disease; chromosome changes in hereditary disease, atrophy and hypertrophy, inflammation, trauma and healing, allergy, auto-immunity, mechanical and physiological stress, development and ageing, degeneration and regeneration, neoplasia.

General principles and methods of treatment of disease

Rest, activity, therapeutic drugs, diet, surgery, radiotherapy, physiotherapy, occupational therapy, speech therapy and psychotherapy.

Methods of improving exercise tolerance and the medical indications for grading this.

General principles of prevention of disease

Positive health education, immunological methods, social and industrial legislation, public health and occupational health measures.

Conditions affecting the locomotor system

Congenital defects treated in childhood: cerebral palsy, limb deficiency, spina bifida.

Progressive disorders of childhood and adolescence: Still's disease, infective arthritis, osteomyelitis, muscular dystrophy and associated disorders.

Congenital abnormalities and other disease with long-term effects: congenital dislocation of the hip, talipes, equinovarus, poliomyelitis, haemophilia, spondylolisthesis, ankylosing spondylitis, rheumatoid arthritis, Sudeck's atrophy, osteomalacia, osteoarthrosis.

Traumatic conditions: fractures and dislocations, head injuries, spinal cord injuries, injuries to muscles, tendons, ligaments and intra-articular structures, hand injuries, contractures, peripheral nerve injuries, amputations, back injuries, burns, multiple injuries.

Consideration should be given to accident neurosis.

Neoplasms: Benign and malignant bone and joint neoplasms.

Neurological conditions

Cerebral palsy, head injuries, epilepsy, meningitis, poliomyelitis, peripheral neuritis, polyneuritis, Ménière's disease, cerebrovascular accidents, cerebellar ataxia, Friedreich's ataxia, motor neurone disease, multiple sclerosis, muscular atrophy, Parkinsonism, brain tumours.

Conditions associated with ageing

Osteoporosis, atherosclerosis, arteriosclerosis, spinal deformities, defects of the special senses, malnutrition and anaemia, cardiac insufficiency, incontinence.

General Medical conditions

Cardiovascular system

Structural defects of the heart, rheumatic carditis, sub-acute bacterial endocarditis, atheroma, hypertension.

Respiratory system

Bronchitis, emphysema, asthma, tuberculosis, carcinoma of the lung.

Digestive system

Ulcerative colitis, gastric and duodenal ulcer.

Urogenital system

The effects of kidney dysfunction: hypertension, oedema, nephritis.

Endocrine system

The effects of endocrine over-action, under-action and defective interaction; myxoedema, hyperthyroidism, diabetes.

Medical and surgical emergencies

Acute chest pain, cardiac arrest, acute abdominal pain, loss of consciousness coma, epileptic fit, cerebro-vascular accident, syncope, shock, haemorrhage.

General principles underlying surgical procedures

Internal fixation of fractures, tendon and nerve transplants and repairs, osteotomy, arthrodesis, arthroplasty, meniscectomy, manipulative surgery, synovectomy, reconstructive operations on the hand, skin grafting, amputations, laminectomy, spinal fusion, stereotaxic surgery, decompression of the brain, valvulotomy, tracheostomy.

Splints and appliances

The indications for surgical appliances and splints, their functions and use: cervical collars, mobile arm supports, hand splints, spinal supports, calipers, drop-foot appliances, adapted footwear, prostheses, ileostomy and colostomy belts, catheters.

PSYCHIATRY

Students study Psychiatry to gain insight into the practical problems which will be encountered in their everyday work among psychiatric patients. They are expected to acquire an understanding of the general features and natural progress of the common psychiatric disorders.

Causes of mental disturbance

Physical factors: Hereditary factors, determining and predisposing.

Derangement of embryonic development due to malnutrition and glandular deficiencies, toxaemia, trauma and birth injuries.

Endocrine changes associated with puberty, pregnancy, climacteric and senescence, Endocrine diseases.

General systemic and localised cerebral structural diseases and biochemical deficiencies leading to impaired cerebral function.

Psychological and social factors: Faulty emotional maturation and adaptation at different developmental epochs. Stresses related to cultural and social demands.

Preventive measures

The positive approach to understanding and preventing psychological stress within the family and the community; avoidance of early prolonged mother-child separations, vocational guidance in adolescent and adult life, care of the elderly.

Symptoms of mental illness

Disorders of cognition: consciousness, reasoning and judgement, memory.

Disorders of conation: volition, abnormal instinctive drives, behaviour disorders.

Disorders of affect: lack of inhibition, mood swings, temperamental peculiarities.

Disorders of perception: hallucinations, delusions, and other thought disorders.

General principles and methods of treatment

Physical methods: electro-convulsive therapy, modified insulin, surgery.
Chemotherapy.
Psychotherapy: individual and group. Strengthening of mental mechanisms.
Occupational therapy, physiotherapy and speech therapy.
Social and environmental methods.

Hospital care: psychiatric hospitals, day hospitals, general hospitals.
Therapeutic communities.
Community care.

Clinical syndromes

Psycho-neuroses: causes, symptoms, course and treatment of depression, anxiety states, anorexia nervosa, obsessional states, phobias, hysteria, psychosomatic disorders, sexual abnormalities.

Psychoses: symptoms, course and treatment of manic-depressive states, involutional depression, schizophrenic states, paranoid states, senile psychoses.

Organic states: general features of metabolic and infective toxaemias, anoxia, hypoglycaemia, cerebro-vascular disorders, tumours, neurological degeneration, head injuries, epilepsy, endocrine diseases and menopausal syndromes (knowledge of morbid anatomy and histopathology not required).

Alcholism and drug dependence: causes, symptoms, management and treatment.

Psychopathic personalities: types, symptoms, and treatment-relationship to anti-social behaviour.

Mental subnormality: types aetiology, clinical syndromes, and treatment.

Psychiatric disorders of childhood

Laws affecting psychiatric and mentally subnormal patients.

A general knowledge and understanding of the laws relating to classification, admission, discharge, control and protection of psychiatric and mentally subnormal patients.

SKILLS USED IN OCCUPATIONAL THERAPY

Occupational therapists must be skilled in a number of techniques in order to fulfill their professional responsibilities. These include the techniques of the management of patients both in the physical and psychological sense, of teaching and treating using a range of skills, and of creating an atmosphere in which good relationships can be fostered and high standards set for staff and patients.

The techniques and activities are divided into groups but there can be no arbitrary dividing lines and some activities may be appropriate under alternative headings, depending on their purpose in the treatment plan. Skill in these areas of practical work is necessary to enable the occupational therapist to meet the different therapeutic needs, capacities and interests of individual patients at any stage in their treatment.

The management of patients

The approach to the individual patient. Interviewing techniques.

Building up patient/therapist relationships on individual and group levels. Methods of integrating individuals into groups.

Methods of gaining attention and maintaining interest, of giving instructions and teaching.

Techniques used in the physical handling and lifting of patients, methods of giving support and help. Prevention of back strain.

Assessment of general competence in basic movement, and of joint and muscle function.

The use of equipment for treatment

Care of tools and other equipment.

Analysis of potential treatment value of standard equipment and tools, including those of daily living.

Setting up and adjustment of equipment. Ability to use the appropriate tools.

Adaptation of equipment to meet special needs, including the application of basic mechanical principles.

Positioning the patient in relation to equipment, to ensure good posture and efficient performance.

Purpose and usage of sling suspension.

Basic techniques for self-care and independence

Assessment of a patient's overall performance.

Self-care activities and habit training. Encouragement of pride in personal appearance.

The principles of good posture and the choice of optimal starting positions to safeguard balance and minimise fatigue.

Methods of compensating for uselessness, poor co-ordination, muscular weakness, loss of reach, lack of grip, one handedness, poor sight, loss of concentration, and confusion.

Techniques of transfer and general mobility for everyday requirements during 24 hours. Criteria to apply when considering the design height and position of beds, seats, lavatories, wheelchairs, handrails and ramps.

Techniques relating to home visits. Assessment of the social climate of the home and of the physical environment in relation to the needs of the individual patient. Making simple room diagrams relevant to treatment and to independence in the home.

Indications and contra-indications for alterations, the provision of personal or home aids or special equipment. Safety in the home.

The principles of re-education in walking. Use of aids, safe walking techniques on the level, on inclines, on steps and stairs. Crossing roads. Wheelchair mobility, and the techniques of pushing wheelchairs. The instruction of helpers.

Basic principles of lifting and carrying.

The principles of relaxation and the importance of its practice in daily life.

Work and craft activities

Some aspects of the following should be included: light manipulative work, bench work, educational activities, office procedures including letter writing.

Progression to reach optimal work performance through choice of suitable work projects and appropriate equipment.

Acquisition of craft skills by using tools and by direct handling of materials. Experience of the problems and satisfaction of completing a piece of work to a high standard.

Methods of upgrading to heavier work within a given activity. Experience of the effects of different positions on movement, level of fatigue, productivity and standards.

Some experience under normal working conditions of one or more of the following: factory work, a service industry, domestic work, outdoor work. Observation and documentation of the working conditions and demands of different types of jobs.

Methods of simulating work situations and try-outs for patients. Practice in breaking down jobs, organising production lines and using simple jigs.

Basic knowledge of methods of work assessment. Practice in administering and scoring simple assessment tests.

Group activities

Promotion and organisation of groups, involving social and recreational projects and situations. The roles of the members of various groups. Knowledge of principles of group dynamics and of the use of non-clinical situations and settings in treatment. Externalising problems, resolving difficulties and encouraging interaction.

General and physical recreation including both structured and free activities.

The use of music, art or drama as projective techniques for group treatment or discussion.

Techniques of observing and recording group reactions for subsequent discussion.

Techniques of promoting verbal and non-verbal communication.

Organisation of work projects for groups.

Domestic activities

Principles of safety in the home and in domestic activities. Awareness of possible hazards and how to combat these.

Basic housework, kitchen work, and day-to-day activities. Energy saving methods and devices. Use of domestic work as a group activity and selected techniques as local treatment for physical dysfunction.

Principles of efficient kitchen planning. Adaptations and organisation within the limits imposed by existing kitchens. Choice of appropriate equipment and tools.

Budgeting, shopping and use of convenience foods. Menu planning based on basic nutritional requirements.

Basic cookery including the production of simple, inexpensive meals for one, for a family, or for larger numbers and social functions.

Understanding of the special problems of the inadequate housewife, and methods of help. Adaptation of standard methods for the physically handicapped.

Simple dressmaking. Some knowledge of adaptation of garments and patterns for the disabled.

A knowledge of the resources in the community which are available to the handicapped housewife.

Basic Splintage

Principles of hand splintage. Different types of functional splints, retaining splints, and resting splints. A knowledge of the most suitable splints for the more common hand conditions.

Practice in making and fitting a variety of hand splints. Experience with different types of splintmaking materials.

Purpose and function of the following: cervical collars, lumbo sacral supports, temporary toe raising splints, shoe raises, wedges and floats, back slabs and other resting splints. A knowledge of simple methods of making these.

CLINICAL EXPERIENCE

Clinical experience is an integral part of the training. In different types of treatment centres basic knowledge and standards of professional behaviour taught in the schools are applied and extended. Demands are made on the student and opportunities are provided for them to develop their professional skills by treating patients of different ages and with different diagnoses.

Students should have opportunities for the following:

Observing and acquiring professional attitudes and behaviour.

Taking responsibility for the treatment of certain patients under supervision; for individuals and groups; for helping with the running of the department; for themselves, their tools and equipment.

Practising the basic skills they have learned, and learning others which are used in the particular treatment situation.

Integrating theory with practice. Adding to their previous knowledge by attending demonstrations and tutorials in the department, reading, discussing, and observing clinical examinations.

Using a variety of activities as treatment for patients in wards, day hospitals, day centres and workshops; participating in home visits, outings and socials.

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Widening their understanding of the work of the team: attending ward rounds, clinics, case conferences, operations; visiting other departments, meeting staff and students of other disciplines.

Each student should keep a log book which is a personal record of work covered during clinical practice. This could include case studies of a variety of patients the student has treated. It should also include plans for treatment, observations, equipment and adaptations, techniques of handling and treating, group activities, assessment of all kinds, individual projects of lectures and demonstrations as appropriate.

The ethical principles for occupational therapists demand that at all times students adopt a strictly professional attitude toward the patient and toward the medical, nursing and other staff at their place of work. No information about a patient should be disclosed to any third party outside the Rehabilitation team without the patient's written permission. The importance of professional confidence and security cannot be over-emphasized.

OCCUPATIONAL THERAPY FOR MEDICAL, SURGICAL AND PSYCHIATRIC DISORDERS

In the following syllabi, indicating the principles of occupational therapy for patients with medical, surgical and psychiatric disabilities and disorders, certain aspects may be referred to in each section. Their repetition is important in that, although the syllabi have, for clarification, to be presented separately, the whole concept and philosophy of occupational therapy can only be introduced to the student by linking them in thought and presentation.

OCCUPATIONAL THERAPY FOR MEDICAL AND SURGICAL DISORDERS

Principles of Occupational Therapy

Principles of occupational therapy underlying the treatment of patients with loss of function resulting from the medical and surgical conditions already mentioned in the syllabus. Correlation of the principles of occupational therapy with the medical findings and treatment.

Special knowledge of the treatment for arthritic conditions, fractures, hand injuries, head injuries, spinal injuries, peripheral nerve lesions, amputations, burns, cerebrovascular accidents, multiple sclerosis, Parkinsonism and cerebral palsy.

Interpretation of the principles of treatment in terms of the skills used in occupational therapy. Selection and adaptation of activities which will be appropriate for individual patients with different or similar diagnoses.

Planning of treatment programmes

Purposeful treatment programmes suited to the individual needs of the patient dependent on diagnoses, prognosis, age, sex, social and working backgrounds. The effect of these programmes of such factors as the facilities in the department, staff/patient ratio and the treatment time available. Planned timetabling in consultation with personnel of other departments.

Realistic programmes designed for short term patients to encourage progression towards early discharge.

Problems of planning on a long term basis for patients with multiple needs.

Balanced and comprehensive programmes for orthopaedic and other long term bed patients with good prognosis.

The role of teachers and technicians in providing educational and pre-vocational facilities. The role of aides and voluntary workers in providing creative and other leisure pursuits.

Appropriate treatment planning for bed patients whose medical condition puts them at special risk to introspection, anxiety or loss of morale.

Methods of grading and changing the emphasis of treatment.

Assessment

The importance of accurate assessment carefully recorded at all stages of treatment:—

As a preliminary to planning treatment. Estimation of impaired function and identification of problems necessitating referral to other departments. The patient's reaction to his condition and his environment.

As a continuing process. Sequential assessment to indicate progress, the need for change in emphasis or content of the treatment programme, and the optimal time for discharge.

As a means of identifying and evaluating abilities, aptitudes, attitudes and work potential. Use of standardised tests and experimental situations.

As comparative testing. Comparison of functional ability prior to and after specific medical or surgical treatment.

As a means of identifying areas of brain damage. Perceptual testing.

Methods of treatment

Appreciation of the scope of treatment: restoration of general fitness when physical stamina, confidence and ability to work have been lost; restoration of local function and improvement of anatomical and physiological function; progressive ability to perform special actions needed for work or recreation; adjustment to permanent disability by development of residual abilities and by learning new methods to improve performance.

Techniques of physical treatment including mobilisation of joints, strengthening of muscles, training of co-ordination; prevention and correction of contractures; the relief and control of pain, effusion, oedema and stress on joints, building up general fitness and stamina.

Treatment for bed patients. The effects of introspection, loss of morale and anxiety; the special needs of those at risk.

Treatment relating to the special problems of geriatric patients in hospital or in their own or residential homes. The functions of day hospitals, day centres and old peoples' clubs.

Adaptation of methods of treatment for different age groups. Special aspects of treating those with visual, auditory or speech defects, and those with other problems of communication.

Safety measures in the department. Methods of dealing with medical emergencies.

A knowledge of the range of special aids and equipment available commercially or made in an occupational therapy department. An understanding of the more usual adaptations which may be needed in a patient's home.

Resettlement and the rehabilitation team

The importance of early recognition of the patient whose disability may affect life at home, social opportunities or employment. The individual's resettlement needs as an essential factor in comprehensive treatment planning. The role of the family in successful resettlement.

General understanding of the scope of the work of the nurse, physiotherapist, remedial gymnast, speech therapist, medical social worker and clinical psychologist. Special knowledge of those aspects of their work which are inter-related with that of the occupational therapist.

General understanding of the contribution and involvement of those who work outside the hospital, disablement resettlement officer, careers officer, social worker, general practitioner, district nurse and health visitor. The scope of occupational therapy in the Local Authority services.

Aspects of social and industrial resettlement within the fields of occupational therapy, including resettlement conferences and clinics. The value of joint consultation in making and implementing resettlement decisions.

OCCUPATIONAL THERAPY FOR PSYCHIATRIC DISORDERS AND MENTAL SUBNORMALITY

Principles of occupational therapy

Principles of occupational therapy underlying the treatment of patients suffering from all types of psychological and psychiatric disorders already mentioned in the syllabus. Correlation of the principles of occupational therapy with the treatment policy of the whole psychiatric team.

A particular knowledge of the variations in psychiatric treatment and the need for a flexible approach when planning occupational therapy.

Planning of treatment programmes

The planning of individual and group treatment programmes, considering the total needs of patients suffering from a variety of clinical syndromes.

The provision of realistic programmes to meet the special requirements of age, sex, social and working backgrounds and duration of illness.

The planning of individual and group programmes to meet the requirements of patients in hospitals, special units and community based centres.

Assessment

The methods of assessing behaviour and progress of patients for diagnostic and rehabilitation purposes. Reporting and recording findings verbally and in writing, individually and in the group situation.

Job simulation and specific rehabilitation methods for psychiatric patients, with particular reference to the stresses of normal working life, and assessment for suitable jobs.

Methods of assessing domestic competence and the degree of independence likely to be achieved.

Methods of treatment

The use of occupational therapy skills to create appropriate treatment situations encouraging confidence, freedom of expression, and social interaction. Provision of situations encouraging the maintenance of personal care and a normal level of

physical activity, and of opportunities for reorientation to work, and to domestic and social aspects of life in the community.

Collaboration with other members of the treatment team in practical group situations.

Emergencies in the department. Preventive measures and psychiatric first aid.

Resettlement and the rehabilitation team

All aspects of rehabilitation and resettlement including social, economic and domestic factors and the particular part played by statutory and voluntary organisations.

An appreciation of the varied opportunities for observation available to different members of the rehabilitation team and the importance of all their findings when planning patient resettlement.

Services available in the community including day hospitals, Industrial Rehabilitation Units, sheltered workshops and sheltered accommodation. The scope of the occupational therapist in the Local Authority service and the role of the disablement resettlement officer.

COMMUNICATION AND MANAGEMENT

Structure and function of statutory and other organisations

An outline of the structure and function of the National Health Service and of the Department of Health and Social Security.

The structure and function of the hospital and local authority services and their inter-relationships. The place of occupational therapy within these services. A more particular knowledge of those departments that provide services to the occupational therapy department or for which the occupational therapy department provides a service. The importance of communication at all levels.

The general provisions of the Department of Education and Science, including the facilities for education available to handicapped children, hospital and home-bound patients. The functions of the careers officer.

The structure and function of the Department of Employment. A particular knowledge of the disablement section, including the work of the disablement resettlement officer and the function of Industrial Rehabilitation Units and Government Training Centres.

The functions of non-statutory organisations contributing to health and welfare, their relationships to the statutory bodies and their inter-relationships.

The implications of social legislation relevant to the work of the occupational therapist.

Departmental organisation

Basic requirements of an occupational therapy department. Special requirements in relation to types of centres and patients treated. Optimal use of available amenities. Implications of current trends in rehabilitation on the choice of equipment. Use and potential of audio-visual aids.

Staffing establishments. The role of the occupational therapist, technical instructor, clerical worker, aide, and voluntary worker. The role of the student.

Organisation of timetables for staff, patients and students. The planning of timetables in relation to the needs of individual patients; their co-ordination with programming in other departments.

The official sources of supply of different types of aids and the channels through which adaptations can be organised in patients' homes. Different systems of financing such help.

Patients' records

Methods of keeping patients' records in the hospital and the occupational therapy department.

Extraction of relevant information from case notes. Methods of referral.

Methods of recording medical findings, treatment and progress.

Different systems of recording and evaluating the results of assessment tests.

Writing appropriate reports for doctors, other departments and outside agencies.

The importance of the insertion of summaries of all occupational therapists' findings in the patient's notes.

The importance of the confidential nature of all medical records.

Stock control and book-keeping

The importance of a simple book-keeping system to record progress of materials through the department.

Ordering and receiving goods. The function of advice notes, invoices, suppliers' discounts.

Simple methods of keeping stock records which are flexible and practicable for occupational therapy departments.

Costing and disposal of goods in hospitals, day centres, and for housebound patients.

Recording the receipt of cash, paying in, and petty cash accounts.

The purpose of an annual audit and practical methods of stocktaking.

Organisation of industrial work

Methods of obtaining work and assessing its suitability. An understanding of the principles of pricing work.
Recording the arrival and departure of goods.
Payment of patients.

Special problems in the local authority field including the distribution and collection of work.

CONDITIONS GOVERNING THE AWARD OF THE DIPLOMA OF THE BRITISH ASSOCIATION OF OCCUPATIONAL THERAPISTS

The British Association of Occupational Therapists awards its Diploma to students who, having followed a prescribed course of full-time training at one of the recognised schools [listed at the back of this manual] have satisfied the examiners in all three parts of the Diploma examination. The Diploma is a recognised qualification for State Registration, and is signed by the President of the Association and the Chairman of Council.

The full-time course of professional training usually consists of:

Attendance at lectures, demonstrations, seminars and classes of practical instruction; practical experience in industry and other areas of work.

THE EXAMINATION FOR THE DIPLOMA

The examination for the diploma of the Association of Occupational Therapists consists of three parts:—

Group I—The Body and Mind in Normal Health.

Group II—Deviations from Health by Deficiency, Disease and Trauma.

Group III—The Practice of Occupational Therapy.

Group I consists of two parts:

Anatomy and Physiology.
Psychology.

Each subject will be examined by means of a three-hour paper, and will normally be taken at the end of twelve month's training. Both subjects must be passed before entry for the final examination. They may be taken together or separately.

Group II consists also of two parts:

Medical and Surgical Conditions Treated by Occupational Therapy.
Psychiatry.

Each subject will be examined by means of a three-hour paper. They must be taken after the preliminary examination and after a minimum of three months clinical experience in the relevant field. They may be taken together or separately.

Group III consists of Course Assessments and three written papers.

The Course Assessments will be carried out on Functional Anatomy Skills Used in Occupational Therapy and in Clinical Experience.

Written papers are as follows:

Three-hour paper on Occupational Therapy for Patients with Medical and Surgical Disorders.

Three-hour paper on Occupational Therapy for Psychiatric Disorders and Mental Subnormality.

Three-hour paper on Communication and Management.

Retakes:

It is the normal policy of the Association to allow two retakes of each part of the examination. Any further retakes can only be granted by the Board of Studies of the Association and will not be granted without a full consideration of all the attendant circumstances. A student who has failed in one or both subjects of Group I will not be permitted to enter for Group III.

CLINICAL EXPERIENCE REQUIRED FOR QUALIFICATION

The candidate must complete:

400 hours in hospitals specializing in the treatment of physical disabilities.

This experience must include treatment of patients suffering from physical injury and disease in both acute and chronic phases, and practice in a general hospital.

400 hours in Hospitals specializing in the treatment of Psychiatric Disabilities.

This experience must include treatment of patients suffering from neurosis and psychosis in both acute and chronic states, and practice in a National Health Service psychiatric hospital.

A further 400 hours in either or both of the above fields or in one allied to them.

Notes on requirements for clinical experience

Two-thirds of the clinical experience must be completed before sitting for the Group III examination, except at the discretion of the Board of Studies.

No concession can be made to candidates for time lost through sickness or holiday.

It is advised that, where possible, clinical experience should be taken in a minimum of three hospitals.

Normally, psychological practice should be taken in psychiatric hospitals or similar institutions, but it is permissible for candidates to take not more than one-third of their psychological practice in a general hospital where the treatment is prescribed by a psychiatrist for not fewer than ten patients.

Two-thirds of clinical experience must be taken in departments recognised by the Association, where full members who have practised for at least three years are in charge, and will be responsible for the candidate's training.

All practice must be taken in circumstances where treatment of abnormality or adaptation to disability is the aim.

The student should have variety of experience including bedside and workshop practice.

Periods of suitable clinical experience in hospitals and other treatment areas under the guidance of a suitably qualified occupational therapist. Some concessions in the length of the period of clinical training may be granted to students holding certain qualifications.

Before each part of the examination the student will be expected to show evidence of having studied the relevant subjects laid down [in this manual] to the satisfaction of the Head or Principal of the School.

Chapter Four

Physiotherapy

The Field Defined

Physiotherapy (called physical therapy in the United States) is a form of treatment which uses various physical means to prevent and treat injury and disease and to assist the process of rehabilitation by developing and restoring the functions of the body so that the patient may lead as active and independent a life as possible. The primary methods of physiotherapy treatment include therapeutic movement, hydrotherapy, electrotherapy, and manipulative procedures (including massage). Patients are referred to a physiotherapist by a physician for treatment after a diagnosis has been made, and it has been determined that physiotherapy would be an appropriate form of treatment. The physiotherapist, therefore, functions as a member of a treatment team which includes physicians, nurses, occupational therapists, and others who work to restore patients to health. In working within this framework, physiotherapists may be employed in a wide variety of settings including general hospitals, clinics, rehabilitation centers, special schools, industry, sports, or private practice.

However, as in the field of occupational therapy, the development of physiotherapy training programs in the United Kingdom has followed a somewhat different pattern from that of physical therapy training programs in the United States. The basic physical therapy professional qualification in the United States is a bachelor's degree or a post-bachelor's certificate which is awarded by an academic institution after completion of an approved program. In contrast, physiotherapy training programs in the United Kingdom have not traditionally been affiliated with degree-granting institutions but rather have been hospital-based programs leading to the Diploma of the Chartered Society of Physiotherapy (CSP). It should be noted, however, that there now seems to be increasing interest in moving these non-academic programs into an academic or degree-granting milieu. For example, Ulster Polytechnic in Northern Ireland has recently established the first physiotherapy degree course in the United Kingdom; and a few other similar programs are in the process of being developed. The four-year degree of Bachelor of Science in Physiotherapy at Ulster Polytechnic is approved by the Council for National Academic Awards (CNAA),[1] and graduates are

1. The role of the CNAA is described in Chapter One, "Up-Front Glossary."

also eligible for membership in the CSP. In addition, there are other polytechnics that are planning to establish degree programs, e.g., Newcastle, Sheffield. However, their programs are in the developmental stage and it is still too early to determine the exact nature and content of the degree programs that will be offered.

Professional Bodies

The Chartered Society of Physiotherapy (CSP), which today combines the functions of a professional association with those of an educational and examining body, has evolved from the former Chartered Society of Massage and Medical Gymnastics. The original Society, which evolved over a long period of time from various organizations, was formed to standardize the training and practice of masseurs, and to supply a code of ethical conduct for those admitted to the registry of the Society. Efforts to achieve these original aims won increased status for the profession, and physiotherapy gradually achieved recognition as one of the professions supplementary to medicine. Generally, hospitals or schools who wished to have their graduates admitted to the Society's register had to follow the Society's syllabus, if their students were to be able to pass the examinations established by the Society. Slowly the CSP became the recognized professional and educational body representing physiotherapists, and the CSP is now the sole examining body of the profession in the United Kingdom. As an educational and examining body, the CSP, in close cooperation with the Physiotherapists Board of the Council for Professions Supplementary to Medicine (CPSM),[2] establishes basic entrance requirements to approved programs, establishes and monitors the syllabus which must be followed by approved programs, examines students, and provides some specialized post-registration courses. The accepted objectives of CSP-approved training programs are to train physiotherapists who have the following skills and knowledge:

—have a knowledge of the basic facts and theories of physiotherapy;

—have acquired an acceptable standard in the performance of basic skills, methods, and techniques of treatment;

—are able to examine and assess a patient by recognizing deviations from the normal, and to keep adequate records;

—are able to select, plan, and implement a treatment plan;

—are able to make professional judgments and to communicate effectively.

—have an insight into medical research methods as a basis for further study.

2. The role of the CPSM is described in Chapter One, "Up-Front Glossary."

To achieve the stated objectives of the CSP program, potential physiotherapists must complete an approved course of at least three years in length and pass the appropriate examinations of the CSP. They are then entitled to the Diploma of Membership of the CSP and use of the initials MCSP.

The CSP protects and advances the interests of the membership and provides various professional services. Also, Membership in the CSP entitles physiotherapists to register with the Physiotherapists Board of the CPSM and to use the title of State Registered Physiotherapist (SRP). Registration with the Board is required of all those physiotherapists employed by the National Health Service. However, it is possible for members of the Society (MCSP) to engage in private practice or be employed outside of the National Health Service and not be state registered. It is estimated that there are currently 600-700 members of the CSP engaged in full-time private practice who may or may not be state registered. On the other hand, there are state registered physiotherapists working in the National Health Service, especially those who are foreign trained, who are not members of the CSP.

Although the CSP is the only recognized professional association for physiotherapists in the United Kingdom, some of its functions are gradually being assumed by the Physiotherapists Board. One of the areas in which the influence of the Board is increasing markedly is basic education or training programs in physiotherapy. Even though a collaborative arrangement in educational matters now exists between the Board and the CSP, the Board has the statutory authority to establish educational criteria for state registration. As a result, since state registration is necessary for employment by the National Health Service, which is the primary employer of physiotherapists, the Board in effect has the power to regulate all training programs in the profession. The important role of the Board in the area of education is also illustrated by the Board's determination of the acceptability of all foreign training in physiotherapy for the purpose of state registration. The current overseas qualifications accepted by the Physiotherapists Board, and any additional requirements established by the Board, are listed in Appendix B.

Professional Qualifications

In the United Kingdom, the basic professional qualification in physiotherapy is the Diploma of Membership in the Chartered Society of Physiotherapy (MCSP), which is awarded after completion of an approved program and success on the necessary diploma examinations. (See Document 5, p. 126.)

Advanced professional qualifications in physiotherapy include the Teacher's Diploma in Physiotherapy (Dip. T.P.) and the Fellowship of the Chartered Society of Physiotherapy (FCSP). The Teacher's Diploma in Physiotherapy is intended for those qualified physiotherapists who are interested in teaching in approved physiotherapy programs. The Fellowship of the CSP may be awarded in recognition of various types of research in the field of physiotherapy.

THE CHARTERED SOCIETY OF
PHYSIOTHERAPY

This is to certify that

has successfully completed an approved course leading to membership of the Chartered Society of Physiotherapy and has been admitted to the Register of Members

Document No. 5

Physiotherapy Helper. In addition to the professional qualifications in physiotherapy, there is also an employment category or title of physiotherapy helper. Helpers are employed in many settings and perform a wide variety of functions. However, like helpers/aides in the field of occupational therapy, persons with this title are not graduates of standardized programs and should not be considered to have had training analogous to training programs for physical therapy assistants in the United States. Even though a particular person with the title of physiotherapy helper may develop a specific skill in working with patients, the helper's duties, which are essentially unskilled and routine, are carried out only under the supervision of trained staff. The helper's training is a continuous in-service process for which no certificate of competence is awarded and for which no generally accepted uniform standards have been developed.

Basic Professional Training Program

There are presently 35 approved training programs in physiotherapy in the United Kingdom (see Appendix A). In contrast to degree programs in the United States, where institutional policy would normally determine entrance requirements, syllabus content, and examination or assessment procedures,

training programs in the United Kingdom must conform to those requirements and procedures established by the Chartered Society of Physiotherapy (CSP) and the Physiotherapists Board of the Council for Professions Supplementary to Medicine (CPSM).

Entry Requirements

The current minimum requirements for admission to an approved basic diploma course are established by the CSP in collaboration with the Physiotherapists Board; however, additional educational requirements may be established by each institution. Candidates for admission must offer the General Certificate of Education (GCE) or the equivalent with passes at the A level in at least one subject and at the O level in at least five subjects. On GCEs dated 1975 and later, Grades A, B, and C are considered to be of an acceptable standard, but Grades D and E are not. For GCE A-level passes, any subject may be offered but academic subjects are preferred and a science subject, such as zoology or biology, is usually considered particularly helpful.

The distribution of GCE O-level subjects should be as follows:

- Two subjects from Group 1 (below), one of which must be either English literature or English language. (Students whose native language is not English must have a GCE pass in English language as one of the two subjects from this group or must hold the Certificate of Proficiency in English of the University of Cambridge.)
- A subject from Group 2 (below) and a further subject from either Group 1 or Group 2. However, beginning in 1980 two subjects from Group 2 will be required.
- Any other subject; however, the following are considered to be most helpful: Elements of Sociology, Statistics, Music.

Group 1: Arts Subjects

British Constitution
Classical Literature (in translation)
Economic and Public Affairs
Economics
English Language
English Literature
Geography
General Paper
Geology
Greek
Hebrew; Classical Hebrew
History (including Economic, Ancient, etc.)
Latin
Logic
Modern Languages other than English
Religious Knowledge

Group 2: Science Subjects

Anatomy
Applied Mechanics
Biology
Biology-with-Physics

Botany	Mathematics (including Pure, Pure Applied, Additional, etc.)
Chemistry	Physical Science
Chemistry-with-Biology	Physics
Environmental Science	Physics-with-Chemistry
General Science	Physiology
Human Biology	Zoology
Hygiene	

In lieu of the GCE standards of performance, the following items also will be accepted for admissions purposes:

- The Scottish Certificate of Education. Students holding this certificate are required to offer three subjects at Higher Grade (bands A, B, and C) and five at Ordinary Grade (bands A, B, and C only; bands D and E are not of an acceptable standard).
- The Northern Ireland Certificate of Education. (Passes in the Northern Ireland Senior Certificate may be offered as alternatives to GCE O levels.)
- The Leaving Certificate of the Irish Department of Education, or the Matriculation Certificate of the National University, Dublin, or of Trinity College, Dublin.
- The University of Cambridge Joint Examinations for the School Certificate and the General Certificate of Education (O level), and the Higher School Certificate and General Certificate of Education (A level). Students holding these certificates must offer credits (grades 1-6) in at least five subjects in the School Certificate, and at least one pass at principal level in the Higher School Certificate. The Higher School Certificate may be one previously passed with credit in the School Certificate.
- A certificate of admission to a degree course of at least three years' length at a university in the candidate's own country.

Particular attention should be paid to the additional entrance requirements established by the various programs themselves (see Appendix A). These requirements tend to be somewhat higher than the established minimum requirements of the Chartered Society of Physiotherapy (CSP), and most schools require at least two A levels, preferably in science subjects. Also, those schools that are developing Council for National Academic Awards (CNAA) degree affiliations with polytechnics will be required by their respective polytechnics to require a minimum of two A levels. However, as in occupational therapy, the intense competition for admission to physiotherapy programs has resulted in a continuous raising of the standard of entry-level qualifications being presented. Consensus is that the majority of applicants now presents at least three A levels, frequently including biology, physics, or chemistry, and clearly represents a standard of ability and achievement that would qualify them for admission to academic degree programs.

Occasionally, individuals already holding other types of professional or academic qualifications (e.g., State Registered Nurse, degrees in basic

sciences) also apply for admission to the basic course in physiotherapy and request advanced standing in the physiotherapy program. There are currently no uniform standards for determining possible exemption from certain subjects or clinical training requirements. Such decisions are left to the discretion of each program Principal, and may also be subject to the approval of the CSP. It is possible, however, for an individual submitting extraordinary academic credentials or extensive clinical experience in a closely related profession to receive some training exemptions on an individual basis.

Course of Study

Unlike students in medical laboratory science, who may gain advancement up the career ladder by completing various levels of training and passing examinations at each step, there is no set classification procedure for student or professional physiotherapists. With the exception of those students participating in the Ulster Polytechnic B.Sc. program, physiotherapy students pursue a three-year program of theoretical and clinical study. This training program, which is approximately two-thirds theoretical and one-third clinical, prepares graduates to function as treatment team members in a variety of clinical settings. However, most physiotherapists in the United Kingdom do not work independently but instead work closely with physicians in clinics or hospital settings.

The basic three-year training program, which includes lectures, seminars, tutorials, and practicals, covers the following areas of study:

Anatomy and Physiology
Behavioral Sciences and Psychological Aspects of Patient Care[3]
General Pathology
Conditions Treated by Physiotherapy
Rehabilitation
Care and Resettlement
Organization and Administration

The prescribed content for each of these general areas can be determined by referring to the syllabus in Appendix C.

The approved syllabus is written in broad general terms and establishes minimum course content requirements. Within this framework, each school has the freedom to arrange the structure and content of its own training program. As a result, and this is also true in occupational therapy, there may be considerable variation in course content and in the actual contact hours for each part of the syllabus. For example, the anatomy and physiology studied may be somewhat different depending on the institution attended and will almost certainly be different from a course of the same title studied by either medical students or students in other professions. In some approved physiotherapy programs, however, the standard of instruction in anatomy and physiology is recognized as being comparable to that taught

3. The content of this general area will vary markedly from one institution to another.

in medical schools; in fact, some of the specific areas in these subjects (e.g., locomotor systems) may be taught in more detail than they would be in many medical school curriculums. On the other hand, instruction based on the same syllabus might in other physiotherapy programs be less theoretical and more practical than the teaching based on a syllabus in medical schools.

In contrast to physical therapy degree programs in the United States, training programs in the United Kingdom are almost totally deficient in the areas of general electives, the humanities, and the social sciences. It is also possible that students entering training programs in the United Kingdom will have deficiencies in such science subjects as chemistry, biology, and physics. A physical therapy degree program in the United States usually includes approximately 30 semester hours in electives distributed over a reasonably wide range of subjects, e.g., psychology, mathematics, child development, and sociology. In addition to these electives, American physical therapy students also complete an aggregate of about 30 semester hours in such subjects as English composition, chemistry, biology, and physics. However, although some students entering training programs in the United Kingdom may present as many as three or four A-level passes, including the various sciences, they definitely lack the breadth of subjects studied by their American counterparts during the first two years of their program.

Table 21 provides a general comparison between the professional components of a hypothetical bachelor's degree program in the United States and an approved diploma training program in the United Kingdom. It must be emphasized that Table 21 provides only approximations for general comparison. Specific comparisons can be made only when information concerning a specific training program in the United Kingdom is compared to a particular program in the United States. Detailed course descriptions and statements of the number of contact hours for each subject studied in the United Kingdom can be obtained from the Principal of the individual program.

Table 22 presents a general year-by-year breakdown of areas of study and subjects studied during a three-year diploma program in the United Kingdom. Tables 21 and 22 reflect the heavy clinical orientation of physiotherapy training in the United Kingdom, in contrast to training programs in the United States where there is considerably more emphasis on theoretical science and general studies. As a result, entry-level practitioners in the United Kingdom may have more highly developed technical skills in some areas than their American counterparts. However, it is probable that the clinical affiliations in a program in the United States are somewhat more diversified than those of a program in the United Kingdom.

Table 21

Comparison of Professional Components of Hypothetical U.S. Bachelor's Program in Physical Therapy with U.K. Diploma Training Program in Physiotherapy

United Kingdom		United States		
Professional Education, Excluding Clinical Experience or Affiliations				
	Contact Hours*		Contact Hours	Semester Hours
Anatomy & Physiology (including at least 24 hours of lab)†	400-500	Anatomy & Physiology	400+	10-12
Physical Principles (augmented by 120 hrs. of practicum)	118	Kinesiology	160	5-6
Movement	330			
Pathology & Bacteriology	20	Pathology	96	3-5
Manipulative Procedures	200	Techniques	192	6
Thermal & Electrical Procedures	200	Physical Agents	224	7
Conditions treated by Physiotherapy	275	Clinical Sciences	256	8-10
Other Procedures	150			
Psychology	0-110	Psychology	96	3-6
		Administration & Mgmt.	160	5
Clinical Experience through Affiliation				
Contact Hours 1,000-1,250		Contact Hours 720-740		Semester Hours 9

*Contact hours of instruction and course content vary markedly. This list provides a very general rule of thumb.

†For detailed description of course content, refer to Appendix C.

Table 22

Areas of Study in Three-Year Diploma Program in Physiotherapy

First Year:	Anatomy & Physiology, Physical Principles, Behavioral Sciences & Psychology (Some Clinical Observations).
Second Year:	Movement, Manipulative Procedures, Currents & Radiations, Conditions Treated by Physiotherapy. (This year also includes 12-15 weeks of practical experience.)
Third Year:	Primarily clinical rotations of varying length and some special subject studies.

Examinations

Old System. Until recently the progress of students in approved programs was monitored primarily by the series of three external professional qualifying examinations of the Chartered Society of Physiotherapy (CSP). This series of examinations ultimately resulted in the Diploma of Membership in the CSP and was structured as follows:

Preliminary Examination—taken after 18 months of training; included sections on anatomy & physiology, physical principles, part of currents & radiations.

Intermediate Examination—taken after 30 months of training; included a written portion on movement, manipulative procedures, currents & radiations, physical treatments, pathology & bacteriology, conditions treated by physiotherapy, self-care & resettlement, other procedures. This exam also included a practical portion in manipulative procedures, movement, and electrotherapy.

Final Examination—taken after 36 months of training. This was a practical/oral exam involving discussions and two treatments on any form of physiotherapy specified by the examiners.

New System. Beginning with those students who entered training programs in 1975, however, a new examination and assessment procedure was established. These new procedures place much more emphasis on the use of internal assessment procedures by each training program than had previously been permitted. The new procedures reflect both changes in attitudes within the professional association, and the movement of some training programs into settings which previously had not been connected with the training of physiotherapists (e.g., the polytechnics). In the early 1970s, the CSP established working parties to review the training and examination/assessment procedures of approved programs. As a result of this review, the CSP strongly urged that a greater degree of internal assessment procedures be developed as part of the examination structure. Also, as some physiotherapy training programs have become affiliated with institutions such as polytechnics, which already possess well-established examination procedures, a certain amount of pressure has been exerted to alter the previous external examination system in an attempt to conform to the procedures already established within the polytechnics.

The new examination system, under which the first students graduated in June 1978, consists of three parts. At present, Part I of the new examination structure, as it is given in most programs, is still basically an external examination prepared and administered by the Chartered Society of Physiotherapy. However, in some schools, especially those affiliated with polytechnics, continuous examinations or assessment procedures are also conducted by the institution. Part I of the new examination consists of written

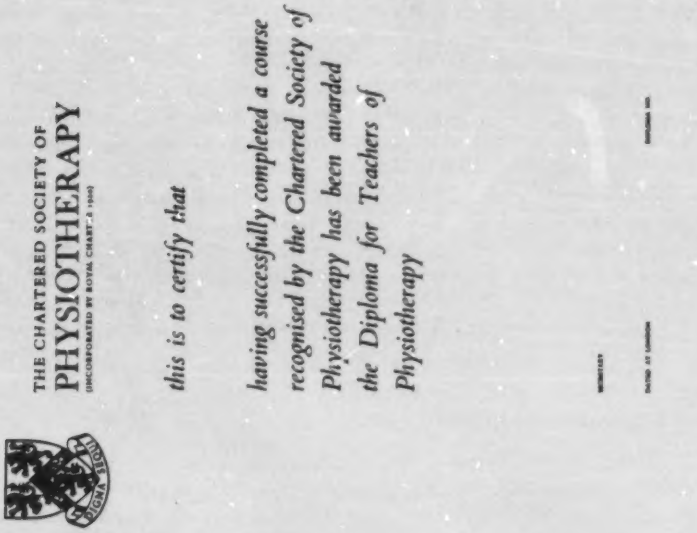
and practical portions covering anatomy and physiology as outlined in the syllabus. In essence, this means that neither the content nor administration of the new Part I is much different from the old preliminary examination. The procedures for Part II, or the Intermediate portion of the old examination, however, have been radically changed. Responsibility for establishing valid internal assessment procedures to monitor student progress through this portion of the syllabus has now been extended to each institution. To assist in the implementation of these changes, the CSP has established and distributed a model designed to assess student programs. This proposed model consists of two three-hour examination papers and a practical assessment procedure. The new Part III, or third stage of the examination, which was first given in June 1978, is still an external qualifying examination prepared and administered by the professional association. The purpose of this portion of the examination system is to provide an overall assessment of the student's theoretical and practical knowledge but it is oriented toward the final part of the training program.

Advanced Programs of Study

In addition to the basic professional training program, there are also advanced professional training programs in physiotherapy. These advanced training programs may lead either to advanced qualifications awarded by the CSP (i.e., the Teaching Diploma in Physiotherapy) or to the development of special treatment techniques (e.g., the Bobath Technique).

Teacher's Diploma in Physiotherapy

The Teacher's Diploma in Physiotherapy (Dip. T.P.) is intended for those qualified physiotherapists who are interested in teaching in approved physiotherapy programs. Members of the Chartered Society of Physiotherapy with at least three years of acceptable experience and State Registered Physiotherapists, who may or may not be members of the Society, with satisfactory educational and experiential qualifications may apply for admission to these programs. The programs consist of four terms of eight to ten weeks each, two terms of which are spent at colleges of education and two of which are spent at schools of physiotherapy. The subjects studied at the colleges of education during the first and third terms are generally the same as those taught to occupational therapists seeking a teaching qualification and include educational philosophy, psychology, sociology, methods of teaching, and curriculum development (see Appendix D). However, also included are some specially designed studies related directly to the teaching of physiotherapy. The second and fourth terms are spent in practice teaching and studying in an approved school of physiotherapy. The student's progress through both the didactic and practical components of the program is monitored by a physiotherapist tutor who is responsible


THE CHARTERED SOCIETY OF
PHYSIOTHERAPY
(INCORPORATED BY ROYAL CHART. A 1944)

this is to certify that

having successfully completed a course recognised by the Chartered Society of Physiotherapy has been awarded the Diploma for Teachers of Physiotherapy

Document No. 6

for the final assessment. Satisfactory completion of the program results in the award of the Teacher's Diploma in Physiotherapy of the Chartered Society of Physiotherapy (see Document 6) and the Certificate in Education which is issued by the College of Education.

Fellowship of the CSP

Fellowship status is awarded to members of the Chartered Society of Physiotherapy (CSP) who submit a thesis, dissertation, or monograph which is deemed acceptable by the Fellowship Advisory Board of the CSP. The stated objectives of the fellowship award are the following:

—to encourage the disciplined application of post-registration research to the field of physiotherapy;

—to increase the body of knowledge available to the profession;

—to encourage personal development of a post-graduate nature;

—to acknowledge excellence in a member of the profession.

To achieve these ends, it is expected that the work submitted to the Fellowship Advisory Board will be of a very high caliber and will contribute significantly to the development of research in the profession. Although there

is certainly some variation in the nature and quality of fellowship work, depending on the researcher and the subject studied, there is consensus among concerned parties that nearly all fellowship projects indicate a very high standard of achievement and the ability to conduct independent research. The development of this award and its generally high standard reflect an awareness within the profession of a need to improve the status of the profession by producing research studies of an exceptional quality. The high standard maintained by the Fellowship Advisory Board in evaluating research projects is indicated by the fact that there are currently only 22 Fellows of the Society out of a total membership of several thousand.

Specialty Training Courses

Training courses in a number of specialty sub-fields within physiotherapy are conducted by specific interest groups of the Chartered Society of Physiotherapy (CSP) and by hospitals and other institutions at which physiotherapists may be employed. Examples of such programs include the specialty courses in spinal manipulation organized by the CSP; courses in the Bobath approach to the treatment of cerebral palsy and hemiplegia; and hydrotherapy courses. However, although the CSP may validate some of these courses (e.g., those in spinal manipulation), there is presently no system for establishing generally accepted standards or for awarding acknowledged specialty certificates which have any registration or salary significance.

Additional Programs of Study

There are also various university-level programs culminating in academic awards that are open to graduates of approved diploma programs in physiotherapy. These university-level programs include the Diploma in Rehabilitation Studies at Southampton University (which has already been discussed in relation to occupational therapy) and bachelor's degree programs in related fields, e.g., anatomy and physiology.

Developments in Professional Training

The field of physiotherapy training in the United Kingdom contains several innovative developments which reflect an awareness of the expanding role of the profession in the area of health care and of the necessity to emphasize a critical approach to subjects in order to increase the academic depth of training programs. As previously noted, there is now a general movement toward the development of an academic degree as the basic professional qualification in physiotherapy.

B.Sc. Degree in Physiotherapy and Diploma of the CSP. Two different training programs, which function concurrently at Ulster Polytechnic, result

in either the B.Sc. degree in physiotherapy or the diploma of the CSP. The entrance requirements for the B.Sc. program are five GCE passes, two of which must be at A level. Also, three subjects which must be included among the five are physics, chemistry, and biology, and one of the three must be at A level.

Entrance requirements for the diploma program are five GCE subjects, including a science subject and a subject testing command of English, two of which must be at A level. The similarity of content of these two programs is shown in Table 23. However, the table also shows that the B.Sc. program provides a broader theoretical base in the basic and clinical sciences and that students are encouraged to develop research and methodology skills.

Table 23

Comparison of B.Sc. in Physiotherapy and Diploma of CSP, Ulster College

B.Sc. in Physiotherapy	Diploma of Chartered Society of Physiotherapy
First Year	
Didactic: Anatomy, Physiology, Physical Sciences, Psychology, Methods of Investigation, Movement Studies	Didactic: Anatomy, Physiology, Physics, Movement, Psychology, Manipulation, Physical Education
Second Year	
Didactic: Applied Anatomy & Physiology, Applied Physics, Clinical & Professional Skills Clinical: 8 weeks	Didactic: Applied Anatomy & Physiology, Clinical Disciplines, Movement, Manipulation, Hydrotherapy, Electrotherapy, Physical Education Clinical: 3 periods of 4-5 weeks
Third Year	
Didactic: Clinical Disciplines, Applied Psychology, Social Studies, Professional Skills Clinical: 16 weeks	Didactic Clinical Disciplines, Professional Skills & Studies Clinical: 3 periods of 4-5 weeks
Fourth Year	
Didactic: Clinical Disciplines, Physiotherapy Studies, Applied Social Studies, two advanced options Clinical: 8 weeks	

In addition to the programs at Ulster College, some other hospital-based programs have affiliated with polytechnics or universities, e.g., Sheffield City Polytechnic, University of Salford. However, most of the programs that are affiliated with polytechnics or universities still continue to award only the Diploma of the Chartered Society of Physiotherapy. Nevertheless, with the trends toward degree programs, the influence of the polytechnics and universities is expected to increase.

Other New Programs. As time goes on, new types of degree programs will almost certainly develop—e.g., Council for National Academic Awards (CNAA) degrees in physiotherapy, and degrees in related fields to be awarded after one year of additional study. The Department of Physiotherapy at Sheffield City Polytechnic, which is a CSP-approved program, is currently considering the possibility of relying entirely on internal assessment procedures and awarding a CNAA degree rather than using the examinations and diploma of the CSP. The discussions that are now taking place between Sheffield City Polytechnic, the CSP, and Council for Professions Supplementary to Medicine (CPSM) are providing a general framework for an exchange of views on the entire issue of degree programs and assessment procedures in the profession.

Program for Visually Handicapped. The North London School of Physiotherapy for the Visually Handicapped, administered by the Royal National Institute for the Blind, is also recognized by the CSP. Candidates for this program come from throughout the world and must possess sufficient communication skills as well as having to meet the same academic standards as sighted applicants who apply to other physiotherapy programs. One of the unique features of this program is a newly established relationship between this institution and the University of Manitoba in Canada which will result in some graduates of the North London program receiving bachelor's degrees in physiotherapy from the University of Manitoba. Since handicapped Canadian students, as well as students from various other countries, frequently attend the North London School, the new program will permit some of these students to attend the first year of general studies at the University of Manitoba before entering the usual three-year diploma program in London. After completing the diploma program and receiving membership in the CSP, the students will then return to Manitoba for a brief session at the University before receiving the appropriate bachelor's degree.

Combined Programs. There have also been attempts by both the physiotherapy and occupational therapy professions to combine some instructional resources. However, problems have been encountered in the implementation of this combined program which indicate the fragmented nature of education resources, both within and between the two professions—as well

as the differences in professional roles as perceived by members of each profession. In addition, there are logistical problems in transporting students to a central location for instruction, and there has also been concern about the structure of the curriculum which sometimes causes delays of four to five weeks between lectures and practicals. However, both problems are administrative and may be remedied. A more serious problem concerns the attitudes or perceptions of the students and staff from the institutions involved. In at least one of the institutions participating in the combined program, the appropriateness of teaching students from professions with different entry requirements and different professional roles was questioned, and the institution concerned no longer participates in the program. This sentiment, prevalent within both professions, is based on the rationale that the syllabuses for the basic sciences and psychology are unique to the needs of the particular profession and that the necessary material cannot be taught in a common setting. However, it seems likely that as more programs in both professions move toward affiliations with polytechnics and other types of tertiary-level institutions (e.g., universities), attempts at combining educational resources and resolving problems of curriculum design will continue.

Summary

A review of physiotherapy training programs in the United Kingdom shows that rapid changes are taking place within the profession. Among those elements most affected are the role of the profession as an integral part of the health care delivery system and the education/examination system. These changes are reflected in the following ways:

- The professional role of the physiotherapist is rapidly expanding in terms of gaining full recognition as a member of the treatment team.
- The role of the professional association as an educational and examining body is slowly diminishing and is being replaced by the participation of various educational institutions and regulatory bodies, e.g., polytechnics, CPSM.

The differences between training programs in the United Kingdom and those in the United States can be briefly stated as follows:

- Generally, training programs in the United Kingdom are professional diploma programs and not degree programs as in the United States.
- Programs in the United Kingdom do not contain the general studies or liberal arts features of programs in the United States.
- The fragmentation of instructional resources in the United Kingdom has resulted in a wide variety of types of course content and contact hours of instruction.

Guidelines to Accompany Placement Recommendations

Guide to Credentials. Members of professional associations are usually able to submit original certificates of membership, i.e., Membership in the Chartered Society of Physiotherapy (MCSP). If a candidate is unable to provide a credential, verification can be obtained by contacting the appropriate professional association directly. Also, although transcripts as known in the United States are not readily available from institutions in the United Kingdom, professional associations can provide information concerning performance on membership examinations and syllabus content. However, information concerning the actual course content and specific contact hours for various parts of the approved syllabus as it is taught at a particular institution can only be obtained by contacting the Principal of that training program. (Addresses for each program are available in Appendix B.)

It is strongly suggested that as much detailed information as possible be obtained about a particular program before any decisions on placement are made because of the wide variety of actual course content and contact hours in the various subjects. It might also be appropriate to request candidates to submit documentation of all other postsecondary, as well as all secondary, study before being placed in a U.S. educational institution.

For information concerning credentials from other types of institutions (e.g., polytechnics, colleges of education, external examining bodies), refer to *United Kingdom.*[4]

Placement Recommendations

The placement recommendations were approved by the National Council on the Evaluation of Foreign Educational Credentials, August 8, 1979. For an explanation of the role of the Council, and for a list of Council members, see pp. 181-182.

1. Diploma in Physiotherapy: Diploma-holders may be considered for undergraduate admission with possible transfer credit which should be carefully considered on a subject-by-subject basis, taking into account the approved syllabus as it is taught at the particular institution and noting carefully the number of contact hours involved. Prior qualifications may yield additional transfer credit. In exceptional cases, consideration may also be given for admission to appropriate graduate programs if it can be determined that the student's overall educational and professional background warrants such consideration. As no claim is being made that this level of education has equality with a U.S. bachelor's degree program, such graduate admission might be limited to those U.S. institutions which will waive the requirement for the degree. In states which require the bachelor's degree for licensing, applicants without a degree should be forewarned that although they may have been

4. Fisher, p. 217.

deemed eligible for admission into a graduate program, they may not meet some states' requirements for licensure (pp. 123, 125-133).

2. Teacher's Diploma in Physiotherapy and Certificate of Education: Persons holding these credentials may be considered for undergraduate or graduate admission in accordance with the preceding recommendation. The work taken for these additional qualifications should yield only undergraduate credit, determined on a subject-by-subject basis, for the education courses completed at a college of education (pp. 133-134).

3. Fellowship in Physiotherapy awarded on the basis of research and thesis: Fellowship-holders may be considered for admission to appropriate graduate programs if it can be determined that the applicant's overall educational and professional background warrants such consideration. As no claim is being made that this level of education has equality with a U.S. bachelor's degree program, such graduate admission might be limited to those U.S. institutions which will waive the requirement for the degree. In states which require the bachelor's degree for licensing, applicants without a degree should be forewarned that although they may have been deemed eligible for admission into a graduate program, they may not meet some states' requirements for licensure (p. 134).

4. Diploma in Rehabilitation Studies: Diploma-holders may be considered for admission to appropriate graduate programs if they also hold the Diploma in Physiotherapy (or a comparable qualification in a related field). As no claim is being made that this level of education has equality with a U.S. bachelor's degree program, such graduate admission might be limited to those U.S. institutions which will waive the requirement for the degree. In states which require the bachelor's degree for licensing, applicants without a degree should be forewarned that although they may have been deemed eligible for admission into a graduate program, they may not meet some states' requirements for licensure (p. 135).

5. Bachelor's Degree in Physiotherapy: Degree-holders may be considered for graduate admission (pp. 135-136).

Appendix A

Physiotherapy Training Programs Approved by the Chartered Society of Physiotherapy

* These Schools train men as well as women; all others are for women only.

a Some accommodation available.

o Training in orthopaedic nursing and in physiotherapy available.

ENGLAND

Bath

* *Bath School of Physiotherapy, The Manor House, Combe Park, Bath BA1 3NW*

Preference will be given to candidates who have obtained a minimum of five 'O' level passes at one time, and are taking two or more 'A' levels. Candidates should have obtained a pass in Chemistry or General Science or Physics or Pysics-with-Chemistry.

Birmingham

a *The Royal Orthopaedic Hosital School of Physiotherapy, Woodlands, Northfield, Birmingham B31 2AP*

Applicants should have obtained a minimum of seven to eight 'O' levels at one sitting and must have studied Physics and Chemistry. Preference is given to candidates who are taking two or more 'A' levels.

The Queen Elizabeth School of Physiotherapy, Queen Elizabeth Medical Centre, Edgbaston B15 2TH

Preference will be given to candidates who offer seven or eight 'O' level subjects which must indicate an adequate science background. Candidates must also offer at least two 'A' level subjects.

Bradford

* a *Bradford Hospitals School of Physiotherapy, The Royal Infirmary, Bradford BD9 5RJ*

Candidates require for admission passes in a minimum of five good quality 'O' levels, four of which must be obtained at one sitting, and in at least two 'A' levels. Candidates who are selected will be told at interview the 'A' level requirements they must achieve for admission. The most acceptable 'A' level subjects are Biology or other sciences.

Bristol

School of Physiotherapy, Bristol Health District (Teaching), Bristol Royal Infirmary, Bristol BS2 8HW

Preference will be shown to candidates with strong 'O' levels who spend two years in a sixth form taking two or three 'A' levels. The 'O' level subjects must include Physics or Chemistry or Physics-with-Chemistry.

Cambridge

a *School of Physiotherapy, Addenbrooke's Hospital, Hills Road, Cambridge CB2 2QQ*

Preference will be given to candidates with six or more 'O' levels who will be taking at least two 'A' levels. The subjects at 'O' or 'A' level should include Physics and Chemistry or Physics-with-Chemistry; in addition either Biology or Zoology is recommended, particularly at 'A' level.

Coventry

* *Coventry School of Physiotherapy, Coventry and Warwickshire Hospital, Stoney Stanton Road, Coventry CV1 4FH.*

This School is under the joint management of the Coventry Area Health Authority and the Lanchester Polytechnic, Coventry. Students are enrolled as Polytechnic students and are required to have passed at least one 'A' level. Preference is given to those having 'O' level Biology and Chemistry (or Physics-with-Chemistry), and favourable consideration is given to mature students.

Halton, Bucks

* *Joint Service School of Physiotherapy, R.A.F. Institute of Community Medicine, Halton nr. Aylesbury, Bucks HP22 5PG*

For members of HM Armed Services and a limited number of civilian students.

Leeds

* *School of Physiotherapy, The General Infirmary, Great George Street, Leeds LS1 3EX*

Preference is given to candidates who:

1. Pass at least five G.C.E. 'O' levels at one sitting, including a science, e.g., Biology, General Science or Physics (some fundamental knowledge of Mechanics is valuable).
2. Obtain two or more 'A' levels, one of which should preferably be a science (Physics at 'A' level is not required). Art or Music might be acceptable depending on the applicant's science background.
3. Attain higher grades at 'O' and 'A' level.

Liverpool

a *School of Physiotherapy, The Royal Liverpool Hospital College, Prescot Street, Liverpool L7 8XN*

Preference is given to candidates with G.C.E. passes in Physics and Chemistry or Physics-with-Chemistry and to those who have obtained the basic five 'O' level passes at one sitting.

London

a *School of Physiotherapy, Guy's Hospital, London SE1 9RT*

Candidates are expected to offer more than the basic minimum and to have 'O' level

passes in Physics, Physics-with-Chemistry or General Science and Biology or Zoology. Passes in two 'A' levels are also required.

a *Normanby College School of Physiotherapy, King's College Hospital, Denmark Hill, London SE5 9RS*

Most entrants have six to eight 'O' levels and one or two 'A' levels, though each candidate is considered on her merits. Preference is given to those who have studied Physics and Chemistry or Physics-with-Chemistry to 'O' level.

a *School of Physiotherapy, The London Hospital, Whitechapel, London E1 1BB*

Preference is given to candidates with at least seven 'O' levels and whose subjects include Physics or Physics-with-Chemistry. Candidates are advised to take at least one science subject at 'A' level.

a *The Middlesex Hospital School of Physiotherapy, Arthur Stanley House, Tottenham Street, London W1P 9PG*

Preference is given to candidates who have passed seven or more 'O' levels and are taking more than one 'A' level. Subjects should preferably include Biology and Chemistry.

* a o *Prince of Wales's General Hospital School of Physiotherapy, St. Ann's General Hospital, St. Ann's Road, Tottenham, London N15 3TH*

'O' level subjects should include Biology or Zoology and General Science or Physics or Physics-with-Chemistry. All offers of places will be conditional on the candidate achieving at least one 'A' level or three 'H' grade passes before entry to training.

Physiotherapy course: Application should be made through the Clearing House.

Orthopaedic Nursing: In conjunction with Notley Hospital, Braintree, Essex, the School also offers a course covering a period of five years in Orthopaedic Nursing and Physiotherapy. Students may enter at 17 if they have obtained the necessary educational qualifications. Application should be made direct to the Principal.

a *St. Mary's Hospital School of Physiotherapy, The Mint Wing, St. Mary's Hospital, Praed Street, Paddington, London W2 1NY*

Preference is given to candidates with passes in at least five 'O' levels at one sitting and more than one 'A' level. Subjects taken should include Physics and/or Chemistry and Biology or Zoology.

a *School of Physiotherapy, St. Thomas's Hospital, London S.E. 1*

Candidates are considered on their own merits, but those with seven or more 'O' levels including Biology who are working for 'A' levels in academic subjects are preferred.

* *School of Physiotherapy, West Middlesex Hospital, Isleworth, Middlesex*

Preference is given to applicants who offer Physics or Physics-with-Chemistry.

* a *The North London School of Physiotherapy for the Visually Handicapped (administered by the Royal National Institute for the Blind), Archway Wing, Whittington Hospital, Highgate Hill, London N19*

Candidates are considered for admission who have a visual handicap sufficient to prevent them training in a sighted school. The educational pre-entry requirements

are those of the Chartered Society of Physiotherapy. Candidates must possess the communication skills appropriate to their degree of visual handicap. Students are not accepted with a second major disability. The Physiotherapy Selection Board of the School require candidates to attend a short assessment course as part of the selection procedure.

Manchester

a *The School of Physiotherapy, Manchester Royal Infirmary, Oxford Road, Manchester M13 9WL*

Preference is given to candidates whose 'O' level subjects are broadly based and who are taking more than one subject at 'A' level.

a *School of Physiotherapy, Withington Hospital, West Didsbury, Manchester M20 8LR*

All applicants are considered but preference is given to those who have obtained the minimal number of 'O' levels at the first attempt, have more than the minimal number of 'O' level passes, have a pass in Physics and/or Biology and obtain good passes at 'A' level.

Middlesbrough

• a *South Teesside School of Physiotherapy, General Hospital, Ayresome Green Lane, Middlesbrough, Cleveland TS5 5AZ*

School opened in the autumn of 1971. Preference is given to candidates who have been successful in six or more 'O' levels, five of which must be obtained at one sitting, and who are currently studying for at least two 'A' levels.

Newcastle

• *Newcastle upon Tyne Polytechnic School of Physiotherapy, Royal Victoria Infirmary, Queen Victoria Road, Newcastle upon Tyne NE1 4LP*

Students are strongly recommended to take more than one science at 'O' level. Preference is given to those who have passed in Chemistry and Physics.

Nottingham

• a o *Nottingham School of Physiotherapy, Hucknall Road, Nottingham NG5 1PG*

Primary selection of suitable candidates is based on their 'O' level General Certificate of Education (or Grade 1 passes in the C.S.E.). These should provide clear evidence of their ability to undertake an intensive course of study in several subjects. Preference will be given to candidates who have achieved passes in two science subjects and who are taking at least two 'A' levels. (Human Biology cannot be accepted as a science subject in this context.)

Physiotherapy course: Application should be made through the Clearing House.

Orthopaedic Nursing: An additional course in Orthopaedic Nursing is available at Harlow Wood Orthopaedic Hospital, which candidates may enter at 17 years of age, or following qualification in physiotherapy. Those wishing to train for the Orthopaedic Nursing Certificate prior to physiotherapy training must meet in full qualifications for entry to the School of Physiotherapy. Further information and details available from the Principal.

Oswestry

a *Oswestry and North Staffordshire School of Physiotherapy, Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, Shropshire SY10 7AG*

Applicants should have a minimum of one 'A' level (Biology recommended) and have passed at one sitting at least four of the five essential academic G.C.E. 'O' level subjects, which should include Physics or General Science.

Salford

• a *The Salford School of Physiotherapy, Salford College of Technology, Frederick Road, Salford M6 6PU*

Preference will be given to those candidates who obtained good grades in 'O' levels at one time and who are taking more than one 'A' level subject.

Sheffield

• *Department of Health Studies (Physiotherapy), Sheffield City Polytechnic, Pond Street, Sheffield S1 1WB*

Preference is given to candidates who have passed six or more 'O' levels at one sitting, particularly if these include Physics and Chemistry, and who are taking two or more subjects at 'A' level.

Wolverhampton

• a *The Wolverhampton School of Physiotherapy, The Education Centre, New Cross Hospital, Wolverhampton WV10 0QP*

Preference is given to candidates whose 'O' level subjects include Physics, Biology or Physics-with-Chemistry, and who are taking more than one 'A' level; Biology is a recommended 'A' level.

WALES

Cardiff

• a *School of Physiotherapy, Combined Training Institute, University Hospital of Wales, Heath Park, Cardiff CF4 4XW*

Preference will be given to candidates whose 'O' level subjects include Biology, Physics or Physics-with-Chemistry and who are taking 'A' levels in more than one subject.

SCOTLAND

Aberdeen

The Aberdeen Hospitals School of Physiotherapy, Woolmanhill, Aberdeen AB9 1GS

Candidates should have a minimum of five subjects at 'O' level and three subjects at 'H' grade or two subjects at 'A' level. Preference will be given to candidates holding passes in Physics and Chemistry.

Edinburgh

* *Edinburgh School of Physiotherapy, Queen Margaret College, 38 Clerwood Terrace, Edinburgh EH12 8TS*

All applicants are considered but preference is given to candidates who hold more than five 'O' levels passed at one sitting and have four passes at 'H' grade or two at 'A' level. Applications are accepted from candidates presented directly for 'H' grade examinations. Subjects studied should include two science subjects.

Glasgow

* *School of Physiotherapy, Royal Infirmary, 106 Castle Street, Glasgow G4 0SF*

Candidates must hold three or more subjects at 'H' grade. Applications will be considered from Scottish candidates who are presented directly for 'H' grade subjects, without having taken 'O' grades, and who will not therefore possess the minimum entry requirements on application.

* *Glasgow Southern General Hospital School of Physiotherapy, 5 Lancaster Crescent, Glasgow G12 0RP*

Candidates should have a minimum of five subjects at 'O' level and three or more at 'H' grade or at least one at 'A' level. Preference is given to candidates with 'O' level Biology, Physics or General Science.

School of Physiotherapy, Western Infirmary, Glasgow G11 6NT

Preference is given to candidates who hold more than five 'O' level passes taken at one sitting, who have passes in Physics and one other science subject, and who have four passes at 'H' grade or two at 'A' level. Applications from candidates presented directly for 'H' grade examinations are considered.

Northern Ireland

* *School of Physiotherapy, Ulster College/The Northern Ireland Polytechnic, Jordanstown, Co. Antrim*

For details of entry requirements to degree and diploma courses apply to the Director of Studies.

Eire

* *Dublin School of Physiotherapy, Federated Dublin Voluntary Hospitals, St. James's Hospital, James's Street, Dublin 8*

Preference will be given to applicants who offer three good performances in Honours papers in the Leaving Certificate of the Republic of Ireland (or two good performances in G.C.E. 'A' level or equivalent), two of which must be science subjects: Biology; Chemistry; Mathematics; Physics; Physics-with-Chemistry (the latter cannot be offered with Physics or Chemistry as single subjects). A wider range of subjects in the Intermediate Certificate of the Republic of Ireland or G.C.E. at 'O' level will be sought.

School of Physiotherapy, University College and Mater Misericordiae Hospital, Dublin 7

Only girls of Irish nationality are accepted for training. They must hold the Matriculation Certificate of the National University of Ireland, the Leaving Certificate of the Department of Education, the General Certificate of Education, Northern Ireland, or the Matriculation Certificate of Trinity College, with passes in at least six requisite subjects.

Appendix B

Requirements for the State Registration of Physiotherapists Trained Abroad

The following qualifications have been investigated by the Board and are accepted for State Registration. In certain cases, the Board also requires evidence of a period of practical experience following qualification.

Australia

Adelaide (South Australia)	Diploma in Technology (Physiotherapy) of the South Australian Institute of Technology (granted from 1973). Diploma in Physiotherapy of the University of Adelaide (up to the end of 1973)— (a) granted after examinations following training at the Royal Adelaide Hospital; (b) granted to physiotherapists without their having attended the full 3-year course. Diploma issued by the Australian Physiotherapy Association (S.A. Branch) prior to 1948.
Melbourne	Diploma of Physiotherapy of the Masseurs Registration Board, Victoria, after examination following training at the Physiotherapy School of Victoria (Lincoln Institute).
Perth (Western Australia)	Diploma (or Associateship) of the Physiotherapist Registration Board of Western Australia granted after examinations set by the Board, or by the technical education division of the Education Department of Western Australia, after training at the Royal Perth Hospital.
Queensland	University of Queensland (a) Degree of Bachelor of Physiotherapy; or (b) Diploma of Physiotherapy.
Sydney, N.S.W.	Graduates of the New South Wales School of Physiotherapy, holding the Diploma of Australian Physiotherapy Association (N.S.W. Branch) Graduates of the Cumberland College of Health Sciences, provided applicants have also completed twelve months internship as required by the Physiotherapists Board of New South Wales (from 1972).

Austria

Qualification awarded by the State after training at recognised schools of physio-

therapy in Austria, provided that applicants have also completed 2 years full-time clinical practice under supervision in Austria following qualification.

Belgium

The qualification "gradue en Kinesitherapie" granted in Belgium by the Ministry of Public Health following a three-year training at one of the recognized schools of Kinesitherapie.

Brazil

Qualification in physiotherapy gained at the Federal University of Pernambuca, Brazil, subject to applicants having had satisfactory clinical experience, the adequacy of such experience to be assessed at an interview/examination.

Canada

University of Alberta	Diploma in Physical Therapy
University of British Columbia	(i) Certificate of the Faculty of Medicine of the University. (ii) B.Sc. degree in Rehabilitation.
Dalhousie Public Health Clinic, Halifax	Diploma of the University of Dalhousie, followed by one further year of clinical experience.
University of Manitoba	Diploma in Medical Rehabilitation.
Université de Montreal	Diploma in Physiotherapy, followed by one further year of clinical experience.
McGill University Montreal	(i) Diploma in Physical Therapy, followed by one further year of clinical experience. (ii) Diploma in Physical Therapy, followed by the Diploma in Occupational Therapy or vice versa. (iii) B.Sc. degree in Physical and Occupational Therapy. (iv) Bachelor of Physical Therapy—4 year course plus 2 months internship. (v) B.Sc. (Physical Therapy)—5 year course.
Queen's University Kingston, Ontario	Diploma in Physiotherapy provided that, as required by the provincial government, applicants have completed a 16-week internship following the final examination.
Université Laval, Quebec	Qualification granted after completion of the course of training in Physical Therapy and the internship period required by the Canadian Physiotherapy Association.
University of Saskatchewan	Diploma in Physiotherapy, followed by one further year of clinical experience.
University of Toronto	Diploma in Physical and Occupational Therapy
University of Western Ontario	Qualification granted after completion of the course of training in Physical Therapy and the internship period required by the Canadian Physiotherapy Association.

Colombia

Graduates of schools recognised by the Colombian Physical Therapy Association subject to satisfactory clinical experience, the adequacy of such experience to be assessed at an interview/examination.

Denmark

Graduates of the four physiotherapy training schools in Denmark:

Skodsborg Badesanatorium;
Teilmann's Institut, Copenhagen;
Institut for Terapiassistenter, Aarhus;
Skolen for Terapiassistenter, Holstebro.

Eire

Diplomas issued by the Universities following training at one of the following schools:

Dublin School of Physiotherapy, PO Box 814, James Street, Dublin

School of Physiotherapy, University College and Mater Misericordiae Hospital, Dublin

Finland

Qualification gained in the Schools listed below, and approved for registration by the Finnish National Board of Health provided that the applicant has had one year full-time clinical experience since qualification, the adequacy of such experience to be assessed at an interview/examination.

Helsinki	Oulu
Jyvaskyla	Tampere
Lappeenranta	Turku

France

Graduates of recognised schools in France gaining the qualification awarded by the State, provided they have also obtained experience in electrotherapy, the adequacy of such experience to be assessed at an interview/examination.

Greece

Graduates of the School of Physiotherapy at the King Paul General Hospital, Athens, Greece, provided that they have also completed at least one year of full-time clinical practice after qualification, the adequacy of such practice to be assessed at an interview/examination.

Hong Kong

Graduates of the Hong Kong School of Physiotherapy who have completed two years full-time postgraduate experience in the general field of physiotherapy.

India

Graduates of the following Schools of Physiotherapy, provided that their period of training and postgraduate clinical experience together amount to a minimum of five

years:

King Edward Memorial Hospital, Bombay;
Government General Hospital, Madras;
Physio-Occupational Therapy Institute, New Delhi;
Christian Medical College, Vellore;
University of Baroda.

Iran

Qualification granted following the course of training at the High Institute of Physiotherapy, Teheran University Medical Faculty.

Israel

Graduates of the Asaf Harofe School of Physiotherapy, Israel.
Graduates of the Kupat-Holim School, Wingate Institute, Natanya, Israel.

Japan

Qualification granted by the Minister of Health and Welfare in Japan following a minimum of three years training at a school of physiotherapy in Japan, subject to applicants having had satisfactory clinical experience since qualification, the adequacy of such experience to be assessed at an interview/examination.

Kenya

Qualification gained following training in the Faculty of Physiotherapy, Medical Training Centre, Kenyatta National Hospital, Nairobi, Kenya, provided that applicants have also completed one year of full-time clinical experience since qualification, the adequacy of such experience to be assessed at an interview/examination.

Netherlands

Qualification granted by the State Commissioner of the Netherlands following training at the schools of physiotherapy approved in accordance with the Netherlands State Regulations, 1965.

New Zealand

Certificate of the Physiotherapy Board of New Zealand granted after State Examinations following training at Dunedin Hospital or Otago Polytechnic.

Graduates of the Physiotherapy School of Auckland Technical Institute, holding the qualification of the New Zealand Physiotherapy Board.

Nigeria

Graduates holding the B.Sc. (Physiotherapy) Degree of the University of Ibadan, Nigeria, provided that they gained first or second class honours.

Norway

Graduates of the former School of Physiotherapy at the Oslo Orthopaedic Institute (closed in December, 1966), and of the State School of Physiotherapy, Oslo, (two-year course) provided that they have also completed one year's full-time clinical experience in hospitals since qualification.

The Norwegian licence to practise granted follow ng training (2½ years plus 1 year internship) at one of the auti orised Schools, viz:—

State School, Oslo;
State School, Bergen;
Mensendieck School, Osl (from 1974).

Pakistan

Karachi	Graduates of the School of Physiotherapy, Jinnah Postgraduate Medical Centre, Karachi, provided that their period of training and postgraduate clinical experience together amount to a minimum of five years.

Poland

Graduates (having qualified as Magister of Physical Education with specialisation in Rehabilitation) of one of the following schools in Poland, provided that they have also completed one year of full-time clinical experience in hospital after qualification:—

Warsaw Academy of Physical Education
Cracow Academy of Physical Education
Poznan Academy of Physical Education
Wroclaw Academy of Physical Education

Portugal

Diploma in Physiotherapy following training at the School of Rehabilitation, Estoril, Portugal, provided applicants have also completed one further year of clinical experience after qualification.

South Africa

University of Cape Town	Diploma in Physiotherapy.
Durban	Graduates of the King Edward VIII School of Physiotherapy.
University of the Orange Free State	Diploma in Physiotherapy.
Pretoria	Graduates of the College of Physiotherapy of Pretoria General Hospital, Transvaal.
University of Stellenbosch	B.Sc. in Physiotherapy
University of the Witwatersrand	B.Sc. in Physiotherapy

Sri Lanka (Ceylon)

Graduates of the School of Physiotherapy, General Hospital, Colombo, provided that their period of training and postgraduate clinical experience together amount to a minimum of five years.

Sweden

Graduates of the three undermentioned physiotherapy schools in Sweden, provided they have also completed at least one year's full-time clinical experience following qualification:

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(i) Stockholm Physical Therapy School—S.I.I.S. affiliated with Karolinska Institute (Stockholm Medical School) and the Karolinska Hospital.

(ii) Physical Therapy School of Southern Sweden—S.S.G.I., affiliated with the University of Lund and the University Hospital, Lund.

(iii) Physical Therapy School of Goteborg.

Switzerland

Graduates of the physiotherapy training schools in Switzerland recognised by the State:

Basel	Burgerspital
Basel	Bethesda Spital
Bern	Inselspital
Geneva	Hopital cantonal
Lausanne	Hopital orthopedique
Zurich	Kantonsspital
Zurich	City Hospital Triemli

Qualification gained at the School of Physiotherapy, Rheumatism Clinic, Leukerbad, subject to applicants having had satisfactory clinical experience, the adequacy of such experience to be assessed at an interview/examination.

Taiwan

Graduates of the Division of Physical Therapy, National Taiwan University, subject to satisfactory clinical experience, the adequacy of such experience to be assessed at an interview/examination.

Turkey

Qualification gained following training at the School of Physical Therapy and Rehabilitation, Haceteppe University, Ankara, provided that applicants have also completed one year of full-time clinical experience since qualification.

United States of America

Qualifications granted by the schools approved by the Council on Medical Education of the American Physical Therapy Association followed by one year's clinical experience.

West Germany

Qualifications granted (i.e. Diploma, and Licence to Practise) after training at the recognised schools of physiotherapy, so long as their training and examinations are conducted in accordance with the West German State Regulations dated 21st December, 1958.

West Indies

Practitioners holding the qualification granted by the School of Physical Therapy, University Hospital of the West Indies, Kingston, Jamaica, subject to satisfactory clinical experience, the adequacy of such experience to be assessed at an interview/examination.

Appendix C

Syllabus of Studies Approved by the Chartered Society of Physiotherapy

Anatomy and Physiology

The study of structure and function should relate the practical application of anatomy and physiology to physiotherapy wherever possible. The emphasis should be on the living and functional aspects of these subjects rather than on unessential detail.

A physiotherapist must have an understanding of the normal development of the human body in order to be able to differentiate between normal and abnormal patterns of movement, a knowledge of which is essential in the assessment and treatment of patients.

The student will be expected to demonstrate knowledge and understanding of the following.

LIVING ANATOMY

To identify by inspection and palpation bony features, tendons, ligaments, joint lines, muscles and nerves, pulsation of arteries.

To indicate on the surface, structures which will include the course of nerves, chief blood vessels, and lymphatics.

To identify the position of:

(a) the heart, including the apex beat;

(b) the lungs, including lobes, fissures, and broncho-pulmonary segments;

(c) general position only of abdominal viscera;

(d) main lymph nodes.

To apply knowledge, in order to understand:

(a) the range of movement normally present in all joints, including any accessory movements;

(b) muscle actions, individually or in groups, and their functional use;

(c) the distribution of nerves—including dermatomes and myotomes

HISTOLOGY

The cell:

(a) its structure and principal constituents;

(b) main properties and functions including cell division.

The structure and functions of epithelia.

Structure and functions of connective tissue, including ligaments, tendons, aponeurones, fascia, and cartilage.

In outline only:

Normal physical development:

(a) the main events occurring during the gestation period;
(b) growth from birth to maturity (especially of nervous and locomotor systems).

OSTEOLOGY

The gross and minute structure of bone.

The growth and development of bone, excluding exact dates of ossification.

The structure, classification, and functions of bones.

Chief muscle and ligamentous attachments (hand, foot, and skull articulated only).

ARTHROLOGY

Classification of joints.

Gross structure of all joints, including attachments of main ligaments.

MYOLOGY

Gross and electron microscopical structure of all types of muscle. The form of skeletal muscles, tendons, aponeuroses, and fascia.

Physiological properties of muscle.

The physical, thermal, electrical, and chief chemical changes of muscle contraction, excluding details of glucose metabolism.

Aerobic and anaerobic changes in muscle contraction.

Effects of training. Fatigue.

The main attachments of skeletal muscles should be stressed with sufficient detail to indicate direction of fibres and resulting actions. (The muscles of facial expression and small neck muscles—direction of fibres only.)

Actions applied to functional use in everyday activites.

NEUROLOGY

The structure of:

(a) neurone;
(b) synapse, motor end-plate;
(c) sensory nerve endings—cutaneous and proprioceptive.

Conduction in fibres, at synapses and motor end-plates, but details of chemical changes not required.

Degeneration and regeneration of nerve including approximate times and significance of neurapraxia, axonotmesis, and neurotmesis.

Position and structure of brain to include lobes and principal fissures, chief masses of internal grey matter, principal tracts, and meninges.

Position and communication of ventricles.

In outline only: position, formation, circulation, absorption, and functions of cerebro-spinal fluid.

Position and structure of spinal cord to include internal grey matter and chief tracts, cauda equina.

Formation of a spinal nerve.

Functions and connection of grey masses and tracts as described above.

Formation and distribution of cervical, brachial, and lumbo-sacral plexuses.

Segmental distribution of spinal nerves. Myotomes and dermatomes.

The formation, course, and distribution of spinal nerves and 7th cranial (facial) nerve and their principal relations.
(Small branches of the cervical and lumbo-sacral plexuses not required.)

Disabilities resulting from severance of these nerves.

In outline only: names and functions of cranial nerves except for the 7th cranial nerve.

Types of reflexes. Importance of reflex action.

The structure of cranial and spinal reflex pathways, polysynaptic and monosynaptic.

The properties of reflexes.

Chief visceral reflexes, e.g. cardio-accelerator, cardio-inhibitory, and cough reflexes.

In outline only:

Autonomic nervous system.

(a) Sympathetic system.
Position and connections of the ganglia.
General distribution of the post-ganglionic fibres.

(b) Parasympathetic system.
General distribution of the parasympathetic fibres of the cranial and sacral nerves.

Functions of autonomic nervous system.

Muscle tone and its maintenance and modifications.

The control of voluntary movement and posture including the correlation between all the components of the neuromuscular system involved.

In outline only: Organs of special sense—eye, ear, tongue, nose.

CARDIO-VASCULAR SYSTEM

Composition and general functions of blood.

Functions of plasma.

Structure, formation, and function of red and white cells—including number and approximate length of life.

Anti-bodies—Immunity, Haemoglobin, E.S.R.

Position, structure, and functions of cells of reticulo-endothelial system.

Blood clotting, including bleeding and clotting time, factors accelerating or slowing the process.

Structure and arrangement of the pericardium, myocardium, and endocardium.

Internal and external features of the heart, including position of conducting system.

Events of cardiac cycle, effects of change in rate of heartbeat.

Pulse—changes in the pulse and their significance.

Cardiac output—minute and stroke volume—Starling's Law—effect of venous return.

Peripheral resistance—factors on which this depends—control.

Structure and function of arteries, arterioles, capillaries, and veins.

Position and course of the superficial veins, including their areas of drainage.

In outline only:

Position and general distribution of the main arteries and deep veins (excluding the diploic veins and dural venous sinuses).

Points where pulse can be palpated. Relationship of arteries and deep veins within main spaces.

Blood pressure:

(a) control to maintain it within normal limits;

(b) variations throughout circulation; normal variations due to activity, age, gravity, and other factors.

Formation of tissue fluid and lymph to include maintenance of the internal environment by changes in hydrostatic and osmotic pressures.

Position of lymph nodes in axilla, femoral triangle, and popliteal fossa and their areas of drainage.

In outline only: those of the head and neck, thorax, abdomen, pelvis; details of thoracic duct not required.

Factors responsible for maintaining venous and lymphatic flow.

In outline only: Structure and functions of the spleen.

RESPIRATORY SYSTEM

Gross and minute structure of respiratory tract from nose to respiratory bronchioles and of lungs, to include the serous and sub-serous coats and pulmonary substance.

The blood of lobes and broncho-pulmonary segments.

Division of bronchial tree. Positions as related to surface of thorax and the application to postural drainage.

Mechanism of respiration, quiet or forced—Changes in diameters of the thorax, intra-pleural and intra-pulmonary pressures, and the subsequent movement of air into and out of the lungs.

Quantities of such volumes as tidal and residual air—vital capacity.

Gaseous interchanges in lung and tissues.

Control of respiration—nervous and chemical significance of changes in rate and depth.

Transport of oxygen and carbon dioxide—details of oxygen dissociation curves and carbon dioxide exchanges as required only to explain the exchange and transportation of these gases.

The maintenance of the pH value of the blood—buffer substances.

In outline only

The digestive system

The general arrangement of the alimentary canal from mouth to anal canal.

The arrangement of the involuntary muscles including the sphincters.

The differences in mucous membranes lining the different viscera.

Functions of each viscus. Chief reflexes.

The position, structure, and functions of the liver and pancreas.

The essential ingredients in a normal diet and the value of proteins, carbohydrates, fats, inorganic salts, and vitamins, and their chief sources.

Modifications of diet required:

(a) in childhood and old age, and
(b) by occupation.

Digestion, absorption, and metabolism of each foodstuff.

Genito-urinary system.

Position, gross and minute structures and functions of the kidneys, ureters, and bladder.

Mechanism of renal secretion–Micturition.

Position, structure, and functions of male and female organs of reproduction.

Endocrine system.

Position, structure, and functions of pituitary, thyroid, parathyroid, adrenal, and thymus glands, ovaries, testes, pancreas.

Abnormalities associated with dysfunction.

THE SKIN

The structure and functions, to include the adaptation of the body to its external environment. The appendages.

The triple response. Axon reflex.

CONTROL OF THE INTERNAL ENVIRONMENT

(a) Regulation of body temperature.
(b) Regulation of water balance.
(c) Acid/base balance.
(d) Basal metabolism.

EXERCISE

The physiological effects on:

(a) the muscular, respiratory, and cardiovascular system;
(b) body temperature;
(c) metabolism;
(d) water balance.

ANATOMICAL SPACES

Position boundaries. Relative position of chief contents of axilla, cubital fossa, femoral triangle, popliteal fossa.

In outline only:

Anterior and posterior triangles of the neck.

Adductor (subsartorial canal).

The Behavioural Sciences and Psychological Aspects of Patient Care

Physiotherapists must acquire the necessary appreciation of the theory underlying psychology, sociology, and psychiatry as applied to physiotherapy.

This includes an awareness of their own behaviour and that of others, and its importance in personal relationships.

As well as formal lectures, the greater part of this section may be covered by group discussion.

RELEVANT ASPECTS OF BEHAVIOURAL SCIENCE

Development of personality;

Description of psychological changes to be expected in normal individuals in infancy, childhood, adolescence, adulthood, and old age.

Assessment of personality:

Validity and utilisation of intelligence and other tests.

Value and pitfalls of observational judgments of behaviour in various situations, e.g. family, work, play.

Explanation of terms used to describe personality traits.

PSYCHOLOGY

Genetic, early and late environmental factors in intelligence, drive, and reactions to stress.

COGNITIVE FUNCTIONS

Learning. Perception and memory. Reasoning. Creative thinking.

EDUCATIONAL TECHNIQUES OF LEARNING

Methods used in theoretical learning, and in learning motor skills.

SOCIAL PSYCHOLOGY

Dynamic structure of the family community; fundamental importance of small face-to-face groups and friendship groups.

Problems of individuals who are not accepted in groups.

Sick role: various ways in which the individual may react.

Inter-relationship of various groups related to patient care.

Reactions to sickness, handicaps, and death.

PSYCHOSOMATIC INTERACTIONS, NORMAL AND ABNORMAL

This should centre on bodily expressions of the emotions.

The normal and pathological manifestations of tension and anxiety.

Influence of psychological factors on illnesses such as rheumatoid arthritis, etc.

PSYCHIATRY

Main psychiatric syndromes, e.g. delirium, depression, neuroses, dementia, psychoses.

MENTAL HANDICAP

General Pathology

A general understanding of the pathology of disease is necessary to be able to study in more detail the clinical conditions commonly treated by physiotherapists, and with this aim, general pathology is included in the curriculum.

INFLAMMATION

Definition. Causes.

Acute, chronic.

Changes, signs, and symptoms.

Termination.

Resolution, suppuration, etc.

Tissue repair.

Factors influencing.

CIRCULATORY DISTURBANCES

Causes, types, signs and symptoms, consequential effects and treatment of:

Thrombosis;

Embolism;

Infarction;

Oedema, local and general.

DEGENERATIONS

Understanding of the terms 'atrophy', 'fatty degeneration', 'necrosis', and 'gangrene'.

Causes.

Consequential effects.

NEOPLASIA

Understanding of the terms, causes, and types.

Consequential effects.

INFECTION

Understanding of the terms 'commensal' and 'pathogenic'.

Causes of infection—Cross-infection.

Production of toxins.

Body's defence mechanism against infections, and factors affecting this.

Outline of immune reaction.

Immunity, natural and acquired.

Principles of asepsis.

Sterile techniques.

Principles of treatment should be included where applicable.

Conditions Treated by Physiotherapy

Instruction should include an outline of the aetiology and morbid anatomy of each condition. Emphasis should be on:

(i) the assessment of the disability as shown by the signs and symptoms;

(ii) the selection of treatment appropriate to these findings.

Where possible, treatment should be related to the activities of daily living and the patient's occupation, and directed towards the development of self-confidence and independence.

It is intended that the term 'treatment' should include pre- and post-operative physiotherapy where surgery is indicated.

Physiotherapy can be used in a wide variety of conditions in the initial, intermediate, and final stages of rehabilitation.

RHEUMATOLOGY

Inflammatory Arthropathies (Arthritis)

Rheumatoid arthritis.

Serum-negative arthritis (including ankylosing spondylitis).

Rheumatic heart disease.

Scleroderma.

Degenerative Arthropathies (Arthrosis)

Monarticular arthrosis.

Multiple arthrosis.

Spondylosis and disc disorders.

Soft Tissue Conditions

Capsulitis.

Bursitis.

Tenosynovitis, tennis elbow, etc.

NEUROLOGY AND NEURO-SURGERY

Neurology

Hemiplegic, paraplegic, and tetraplegic syndromes.

Head injuries.

Multiple sclerosis.

Parkinson's disease.

Polyneuritis, peripheral neuropathy.

Peripheral nerve injury.

In outline only:

Syringomyelia.
Spina bifida and its complications.
Muscular dystrophy.
Cerebral palsy.
Motor neurone disease.
Poliomyelitis.
Tabes dorsalis.
Myasthenia gravis.

Neurosurgery

Pre- and post-operative treatment as applicable.

TRAUMA AND ORTHOPAEDICS

Fractures

Classification.

Types of displacement.

Immediate and later signs and symptoms.

Changes at fracture site, and in surrounding tissues.

Methods of reduction and fixation.

Healing of fractures and factors influencing.

Complications.

Common sites of fracture.

Physiotherapy for each fracture:

(a) during immobilisation period;
(b) during mobilisation period.

Dislocations, Sprains, and Strains

Soft-tissue Injuries

Traumatic synovitis (acute and chronic).

Skin wounds, contusions, haematoma.

Muscle rupture and tendon injury, partial and complete.

Crush injuries

Congenital Absence of Limb

Amputation:
Traumatic.
Elective.

Deformities:
Congenital and acquired.
Postural abnormalities.
Structural deformity—Common deformities only.

Bone Conditions
Osteoporosis.
Osteomalacia.
Paget's Disease.

Corrective surgery.
Arthroplasty, Arthrodesis, Osteotomy.
Tendon transplant, and grafting.
Soft tissue release.

Prolapsed intervertebral disc: laminectomy; spinal fusion.

CARDIO-VASCULAR AND RESPIRATORY CONDITIONS

Hypertension; Heart failure; Cor pulmonale.

In outline only: Edocarditis; myocarditis; pericarditis.

Valvular incompetence and stenosis.

Congenital heart defects.

Inflammatory and obliterative disorders of blood vessels.

Venous leg ulcer, Varicose veins, Ischaemic ulcers.

Surgical procedures related to peripheral vascular diseases.

Asthma; acute and chronic bronchitis; emphysema.

Pleurisy and pneumonia. Bronchiectasis. Lung abscess. Empyema.

Carcinoma of respiratory tract.

Cystic fibrosis (mucoviscidosis).

In outline only: Pulmonary tuberculosis.

Pre- and post-operative physiotherapy relating to cardio-thoracic surgery. Complications, e.g. atelectasis; pneumothorax; broncho-pulmonary fistula.

GENERAL SURGERY

Types of incision.
Abdominal surgery.
Mastectomy; Thyroidectomy.
Complications related to the above.
Pre- and post-operative physiotherapy.

OBSTETRICS, GYNAECOLOGY

Ante-natal and post-natal training.
Complications of pregnancy:
Weak abdominal and pelvic floor muscles.
Stress incontinence.
Prolapse.
Breast abscess.
Special points relative to pelvic surgery.
Pelvic inflammatory conditions.

DERMATOLOGY

Skin infections: acne, boils, and carbuncles.

Burns: degrees of burns.

Pre- and post-operative physiotherapy relating to plastic surgery.

Alopaecia

Psoriasis.

EYE, EAR, NOSE, AND THROAT CONDITIONS

Menière's Disease, middle ear infections.

Sinusitis.

Carcinoma of larynx and oesophagus.

Pre- and post-operative treatment as applicable.

PAEDIATRICS AND GERIATRICS

The special problems of the elderly and very young.

The particular conditions to which they are prone.

The modifications of the treatment programme relative to the particular needs of each age group.

Rehabilitation

Rehabilitation signifies the measures which may be taken to restore optimum function and is a continuous process from the onset of disability to the point at which the patient achieves his greatest potential. The physiotherapist is a member of the team, whether in the hospital or the community, and it is expected that she will make an assessment of the patient's condition and select the appropriate treatment from the methods available. A continuous assessment will be made while the patient is having treatment so that progress may be recorded and evaluated.

The various procedures used in physiotherapy are given below.

A. MOVEMENT

The experience and understanding of natural activities related to all stages of development should provide a foundation for the recognition and analysis of abnormal activities and a basis for planning rehabilitation.

Principles of Mechanics—relation to static and dynamic activity of the human body

Movement: linear—angular
velocity, acceleration.

Nature and effect of forces:

Newton's Laws of inertia, acceleration, reaction.

Force and Impulse.

Summation of forces. Parallelogram and resolution of forces.

Energy, work, power.

Gravity, centre of gravity, line of gravity.

Friction.

Levers.

Equilibrium, base, and balance.

Nature and Properties of Water

Archimedes' Principle, buoyancy, movement of force, density, specific gravity.

Wake, turbulence, streamlining.

Hydrostatic pressure.

Relation of above to:

Internal forces of body—Components of muscle forces, angle of pull, leverage, etc.

External Forces applied to Body

This would include principles and uses of weights, springs, pulleys, suspension, water, etc.

Analysis of Joint Movement and Muscle Action

Observation of joint range in normal and variations within normal limits.

Muscle action: This must be associated with joint movement to give total analysis and involves a knowledge of:

Isotonic contraction—concentric (shortening),
eccentric (lengthening);

Isometric tension—static muscle work;

Group action of muscles.

Analysis of patterns of movement including—rolling, lying to sitting, sitting to standing, walking.

Developmental sequence of movement from baby to adult

Practical experience, and observation, of normal movement

Passive, assisted, active, resisted movement

Methods of Teaching

(i) An individual;
(ii) A group.

Therapeutic Pool

Maintenance.

Selection and care of patients.

Treatment techniques.

Sport

(i) Adapted for the use of patients who cannot return to normal function, for example, paraplegics, cerebral-palsied, amputees;
(ii) Used as a means of advanced rehabilitation where patients are returning to

normal or to an activity or occupation which requires considerable physical effort.

Prevention of Postural Strain and Occupational Hazard

The correct use of body mechanics at home, at school, at work, and recreation.

Particular application to patients, physiotherapists, and other hospital staff.

Application of Techniques to the Treatment of Patients

The physiotherapist must have a knowledge of the indications and contraindications for the methods used.

The selection of techniques at each stage of treatment is dependent on a detailed and continuous assessment of the patient. The assessment will indicate which of the following objectives must be achieved to restore full function or maximum independence.

Relaxation—local and general

Inter-relation of mental and physical tension.

Recognition of physical tension—local and general.

Methods of achieving relaxation including support, positioning, and movement.

Maintenance and Restoration of Range of Movement and Joint Stability

Combination of mobilising and strengthening techniques to give optimum function.

Methods dependent on cause of limitation which might involve:

(i) articular change—methods of strengthening muscle to maintain existing range and improve function, might be used;

(ii) periarticular change, giving swelling, muscle tension, muscle weakness, muscle spasm, adhesions, or scars—appropriate methods to reduce swelling, reduce hypertonicity, strengthen muscle, stretch adhesions and scars, could be used.

Initiation and Stimulation of Muscle Contraction

Maximal sensory stimulation when appropriate—for example, touch, brushings, tendon tapping.

Irradiation from strong components in movement or from resistance to other parts of the body.

Successive induction.

Strengthening Muscle, and Increasing Endurance

Strengthening—demanding maximal effort from patient through all stages of recovery.

Techniques could be chosen from the following:

Assisted active exercises.

Free active exercises—involving use of gravity, friction, levers.

Resisted exercise: *manual:* slow reversals, holdings through range, repeated contractions, stabilisations, etc.

mechanical: progressive resistance using weights and pulleys, springs, etc.

body weight:

Endurance: High repetition, low resistance exercises.

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Reduction of Hypertonicity

Spasm, spasticity: support.
positioning (include reflex inhibitory positions, shakings).
movement—for example, reciprocal relaxation, hold relax, contract relax, use of other parts of the body, reflexes.

Rigidity—methods of facilitating movement.

Re-education of Posture, Balance, and Co-ordination

Posture and balance—control of positions, postural reactions, etc.

Co-ordination—facilitation techniques leading to co-ordinated free movements.

Re-education of Gait

Re-education and Improvement of Respiratory Movements

Mobilisation of the thorax, localised breathing, positioning to facilitate respiration, postural drainage.

Re-education of Function relative to Work of Patient

This is dependent on correct analysis and assessment of abnormal movements followed by use of relevant methods to produce normal movements and build into correct functional pattern. If normal movements are not possible, then every effort must be made to produce optimum function.

B. MANIPULATIVE PROCEDURES

The student must be able to demonstrate:

The use of manipulative procedures:
for the assessment and appreciation of abnormalities of joint movement;
for their specific effects.

The manipulation of soft tissues and joints by passive means including:
manual examination of joint movement and tissue resistance;
mobilisation techniques of all joints. (It is expected that students should only take these to the point where the movement can be controlled/prevented by the patient.)

Massage techniques:
Effleurage and stroking.
Compression—kneading, picking up, wringing, skin rolling.
Frictions.
Percussion—clapping.
Shaking and vibrations.
Rib springing.

Application of spinal traction.

Postural drainage.

The student must be able to apply these skills in order to:
mobilise the skin, scar tissue, connective tissue, muscles, tendons, and ligaments, restore gliding surfaces of tendons within a sheath;
improve or maintain the range of movement and function;
assist the removal of excess tissue fluid;

improve peripheral circulation;

affect the sensory nervous system, e.g. in muscle spasm and relief of pain;

stretch soft tissues with or without the use of corrective appliances or other mechanical means, e.g. stretching out a contracture, traction;

assist the mechanical drainage of secretions from the chest.

C. THERMAL AND ELECTRICAL PROCEDURES

The physiotherapist should have knowledge of the therapeutic use, and skill in the application of the following.

Heat

Short-wave diathermy by electric field and inductothermy methods.

Infra-red generators.

Wax.

Hot packs—wet and dry.

Cold—Cryotherapy.

Ice.

Contrast baths.

Ultra-violet irradiation

Local and general.

Ultrasonics

Muscle-Stimulating Currents to Normal and Denervated Muscle

Long and short duration stimuli.

Principles of Electrodiagnosis

Strength duration curves and their interpretation.

Application of Procedures

The application of these procedures requires an understanding of:

the underlying physical principles;

the effects, physical and physiological;

indications and contra-indications;

dangers and precautions;

techniques of application.

PHYSICAL PRINCIPLES

Structure and properties of matter.

Structure of atom, molecules, elements, compounds.

Solids, liquids, gases.

Properties of matter, including cohesion, adhesion, surface tension, viscosity, density and elasticity.

Electrical Energy

Nature of electricity.

Current and static electricity.

Conductors, insulators.

Ohm's Law, Joules' Law.

Electric fields, dielectrics.

Magnetic fields, electro-magnetic induction.

Transmission of electricity through solids, electrolytes, and gases.

Brief outline of mains distribution.

Dangers—short-circuits, shocks, fire.

Precautions—Safety devices, transformers, earthing, 3-pin plugs, insulation, fuses, switches.

Thermal Energy

Physical effects of heat—change of state, change in viscosity, expansion.

Effect of temperature on chemical reaction rates.

Transmission by conduction, convection, and radiation.

Units of heat and temperature.

Radiant Energy

Outline of electromagnetic spectrum.

Reflection, refraction, and absorption.

Cosine and Inverse Square Laws.

Sonic and Ultrasonic Energy

Nature of sonic and ultrasonic waves.

Frequency, amplitude, wave length.

Properties of sound waves.

Transmission in solids, liquids, and gases.

PHYSICAL AND PHYSIOLOGICAL EFFECTS PRODUCED BY:

A rise in temperature (local and general) in response to the application of infra-red irradiation, short-wave diathermy, wax, hot packs, and hot water.

A fall in temperature related to ice and cold water.

Alternate heat and cold.

Ultra-violet irradiation—local and general.

Ultrasonic waves.

Muscle-stimulating currents.

Care and Resettlement

GENERAL CARE

Simple nursing procedures.

Aseptic techniques and prevention of cross-infection.

Lifting and handling of patients.

Methods of rolling patients (a) alone and (b) with other staff

Methods of lifting and transfers, including:

Shoulder lift (Australian lift).

Double lift—combination of both.

Folded arms lift.

Transfer of patient from bed to chair and vice versa.

Lifting of patient from floor to chair.

Mechanical aids—hoists, bedlifts, sliding board.

Care of pressure areas.

Methods and frequency of turning and positioning of patients, including the use of special beds and packs.

Teaching patients to relieve own pressure areas.

Skin care.

INTENSIVE CARE

Students should be encouraged to observe in an intensive care unit, in order to have an understanding of the following:

General principles of intensive care and artificial respiration.

Care of pressure areas as above.

Maintenance of clear airways.

Maintenance of joint range and muscle length.

Knowledge of patient's nutritional needs.

Importance of charts and X-ray films.

Recognition of respiratory embarrassment—use of stethoscope.

General principles for use of respirators.

Endotracheal tubes, tracheostomy.

Use and care of suction apparatus, including sterile technique.

Use and care of drainage tubes and drips. Measures to be taken if tracheostomy tubes become blocked.

Patient monitoring. Recognition of changes in pattern and their significance.

Special care involved in the treatment of the unconscious patient.

EMERGENCY CARE

First aid and resuscitation procedures for:

Cardiac arrest—emergency procedures including external cardiac massage, methods of artificial respiration;

Syncope, burns and electric shock, haemorrhage, and other accidents.

MEASURING DEVICES

Goniometer, dynamometer, spirometer, peak flow meter, vitalograph, and sphygmomanometer.

Methods of recording, use and interpretation of charts, records, and X-ray reports.

AIDS AND APPLIANCES

Principles of prescription and function of aids and appliances.

Assessment of patient:

Choice of appliance, type of material best suited to particular disability. Hazards of choosing wrong appliance.

Technique and Manufacture of Splints

Plaster of Paris.

Thermoplastics, with special reference to cervical collars and lumbar supports.

Use and care of surgical appliances—temporary or permanent:

Simple adjustments.

Bandaging

Selection and application for:

Securing dressings.

Control of oedema.

Support.

Management of Amputees

Stump care and bandaging.

Application of prosthesis.

Technique of training patient in its use.

Walking Aids

Selection and measurement of crutches, sticks, or appropriate walking aid.

Instruction in their use and care.

Wheelchairs

Types and modifications available and their uses.

Selection according to patient's needs, ordering, and maintenance.

Aids to Daily Living

Knowledge of aids, appliances, and modifications available.

Assessment for need of ramps, grabrails, half steps, and other aids to independence, in the patient's home.

RESETTLEMENT

The role of the physiotherapist in the assessment of physical capability in relation to individual home environment, specific occupation, or available institutional care. Kinesiology of different occupations.

Management and advice to patients and relatives in the adjustment to disability in the home.

Planning of home treatment schemes.

Medical rehabilitation units (full day attendance or residential).

Industrial rehabilitation units (Government or voluntary).

Vocational training centres.

Sheltered workshops.

Day centres.

Some knowledge is required of the role of all those involved in resettlement Facilities provided by Local Authorities and other bodies in arranging alterations to patients' homes, lending wheelchairs, commodes, etc.

Organisation and Administration

A knowledge of the structure and function of the present National Health Service and its future development is essential if the physiotherapist is to wrok effectively. An appreciation of the principles of management is necessary to understand the planning and organisation of departmental services.

ORGANISATION OF THE N.H.S. AND ADMINISTRATION OF HOSPITALS

Structure of the Health Service.

- Hospital Service.
- General Practice.
- Local Authority Services.

The scope of the physiotherapist's role in the above, in private practice and in industry.

ORGANISATION OF A HOSPITAL

Outline of work of different departments.

Organisation of physiotherapy department—physiotherapists, ancillary staff, equipment.

Deployment of physiotherapists in wards and departments, including weekend work and 24-hour service.

Organisation of appointments system, hospital records, and patient transportation.

COMMUNICATIONS

With:

- Patients and relatives.
- Physiotherapists.
- Medical and nursing staff.
- Paramedical staff.
- Staff in other hospitals.

Methods:

- Oral communication.
- Practice in speaking in small discussion groups, leading a meeting.
- Presentation of patients' case histories.
- Organisation of information for presentation.
- Demonstration of treatment procedures to small groups.

Written reports:

- The reasons for, and methods of, writing reports accurately, legibly, and concisely.
- The necessity of keeping adequate written records, e.g. in case of subsequent legal procedures.

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SAFETY PRECAUTIONS

Design structure and fittings of the department.

Regular inspection of all apparatus.

Knowledge of fire precautions.

Accident regulations and accident procedure:

Elementary first aid.

Hospital emergency procedure.

Importance of completion of accident report.

PROFESSIONAL RESPONSIBILITIES

Professional ethics and standards (including confidentiality of notes, etc.)

Legal liabilities.

Responsibilities, privileges, and advantages of membership of professional bodies.

Chartered Society of Physiotherapy.

Whitley Council.

Council for Professions Supplementary to Medicine.

GUIDELINES FOR RESEARCH

Critical appraisal of clinical practice.

Analytical assessments of research and other material.

Use of professional journal, literature, and extraction of data.

Course Organisation

1. The responsibility for the organisation of the course shall be vested in the Principal.
2. The course will include clinical experience in the treatment of patients, as well as practical and theoretical tuition.
3. Lecturers will include physiotherapy teachers, and specialists in the different sections of the Syllabus.
4. Students should have the opportunity to handle pre-dissected parts, and observe physiology demonstrations.
5. Clinical practice should be planned to give breadth and depth of experience, and should be under the supervision of qualified physiotherapists. The student is undergoing full-time education, and the amount of clinical work must be organised accordingly. The student must understand that clinical practice involves professional responsibility towards the patient.
6. It is expected that students will have the opportunity to attend ward rounds, clinics, and staff conferences, where suitable. Intelligent observation of the work of other departments should be encouraged.

7. It is hoped that the course will stimulate the student to become aware of the variations in normal movement present in different age groups and occupations.
8. Visits should be arranged to specialised therapeutic centres, which might include a school for handicapped children, limb-fitting centre, spinal injuries centre, etc.
9. The physiotherapist should appreciate the work of the other personnel involved with patient care, and co-operate with them.

Appendix D

Topics Covered in Education Course Component of Teaching Diploma/Certificate in Education Program

SOCIOLOGICAL ASPECTS OF EDUCATION

Autumn Term Topics

1. Introduction to the Sociology of Education: an outline of the relationship between the educational system and other aspects of society.
2. The Concept of Socialisation: a consideration of the attitudes, knowledge and skills transmitted to young people and of their response to this process in the family and in education.
3. The Concept of Socialisation: continued.
4. Educational Opportunity: an examination of some aspects of the social background of young people, and of the organisation of education, which may affect attainment.
5. Educational Opportunity: continued.
6. The Sociology of the Classroom: the relationship between students and teacher, social influences on learning; the role of language in learning.
7. The Socioiogy of the Classroom: continued.
8. The Social Position of Youth: student subcultures; deviance; the labelling process in the classroom; attitudes to authority; social factors influencing success and failure.
9. The Social Position of Youth: continued.

Summer Term Topics

10. The transition from school to work: influences upon occupational choice.
11. Education and Work in Industrial Society.
12. The Curriculum: Social factors influencing the curriculum, and current pressures for change.
13. The Curriculum: continued.
14. Minority Ethnic Groups in Education: the special problems of immigrant students.
15. The Educational Institution as an Organisation: with particular reference to the further education college.

16. The Professional Role of the Teacher.
17. De-Schooling: a critical examination of some proposals for the replacement of education as institutions.

PSYCHOLOGY OF EDUCATION COURSE

Autumn Term Topics

1. The Preparation of objectives in course and lesson planning and evaluation: A case-study.
2. Learning theory as a guide to bringing about effective student learning. A critique.
3. The organisation of material to be learned: The acquisition of manipulative, thinking and communication skills.
4. The organisation of material to be learned: Gestalt psychology and 'insightful learning'.
5. The teaching and learning of concepts and principles: 1.
6. The teaching and learning of concepts and principles: 2.
7. The teaching and learning of concepts and principles: The role of language in the process.
8. The individual and the group: Group interaction and individual perception.
9. The Individual and the group: Group cohesion and conflict.
10. The individual and the group: Leadership styles and classroom control.

Summer Term Topics

11. Aspects of student motivation: an examination of some of the factors that may influence a student's interest in and commitment to his course of study.
12. Students in the classroom: Case studies that review the course to date and set the scene for what is to come.
13. Attitude formation and change: psychological aspects of attitude modification in teaching.
14. Individual differences in personality: the nature of the concept of personality. The measurement of personality—the 'self-picture' and its educational implications.
15. Individual differences in personality: the effects of student personality on work-style, receptiveness and creativity.
16. Individual differences in student performance: the problems of attempting to measure differences in student ability and aptitude.
17. The special problems of the older student: an examination of problems faced by the older person on college courses.

HISTORICAL AND CONTEMPORARY STUDIES OF FURTHER EDUCATION

Autumn Term Topics

A. Origins of Modern Further Education

Week

1. Introduction: The English Education System with particular reference to the organisation and characteristics of Further Education.
2. Nineteenth Century Technical Education: (a) Two Examining Bodies: the influence of external examining bodies on the development and curricula of technical education.
3. Nineteenth Century Technical Education: (b) The Technical Education Movement: the aims and programmes of early propagandists influential in laying the foundations of technical education.
4. Twentieth Century Further Education: (a) 1900-44: the growth of the distinctive sector of the education system known as 'further education', with particular reference to the Further Education clauses of the 1944 Education Act.
5. Twentieth Century Further Education: (b) 1944-77: the expansion of Further Education during the post-war period, including a discussion of the many and varied aims and functions of contemporary further education colleges.

B. Aspects of the Educational Provision for the 16-19 Age Group.

7. Twentieth Century Secondary Education: 'Secondary Education for All', the comprehensive movement and the implications for further education.
8. Continuative Education: a close look at a recurring theme in educational history—the aims and content of compulsory further education for all.
9. The Education 'Problem' of the 16-19 Age Group: the scope of the problem and a critical look at some attempted solutions.
10. Further Education and the 'Disadvantaged': with particular reference to provision for 'new' groups of students in further education.

Summer Term Topics

C. Vocational Preparation

1. Education and Industry: a general discussion of the relationship between education and industry.
2. School-College Link Courses: benefits and problems of the school-college co-operation in the provision of vocational 'tasters'.
3. The Work of the Training Services Agency: the effect of the activities of this new agency on the work of further education colleges and teachers.
4. Comparative Aspects (a) The USSR
5. Comparative Aspects (b) Western Europe

Two international comparisons and contrasts

D. Higher Education within Further Education

6. Public Policy with regard to Higher Education (i) The 1966 White Paper & the 'Binary Dilemma'.
7. Public Policy with regard to Higher Education (ii) The 1972 White Paper—Expansion within a rationalised framework.
8. Comparative Aspects: Higher Education in the USA.

PRINCIPLES OF EDUCATION COURSE

Autumn Term Topics

Introductory Lectures

1. The Principles Course: An introduction to the course and a discussion of the way in which Philosophy of Education might assist with the solution of problems in Further Education.
2. Plato for Today. A discussion of the importance—and relevance of Plato's educational ideas.
3. John Dewey and Progressive Education. Is the 'progressive' approach the appropriate one in Further Education?
4. The Concept of Education. An examination of a modern analysis of the concept.

Processes of Education

5. The Concept of Teaching. Teaching as a polymorphous term. What is it that picks out an activity as a 'teaching' activity?
6. The Concept of Training. How real is the distinction between 'training' and 'education'?
7. The Concept of Indoctrination. A critical evaluation of various analyses.
8. 'Integration'—Its meaning and consequences.
9. Revision and Feedback Session.

Summer Term Topics

The Content of Education

10. Aims and objectives in Education.
11. Forms of Knowledge and Liberal Education. An introduction to the forms of knowledge argument and its curriculum implications.
12. Moral Education and Education of the Emotions. Their place in further education.
13. Vocational Education and Education for Leisure.
14. Aesthetic Education. The meaning of 'aesthetic' 'aesthetic objects' and works of art. Aims of aesthetic education.

The Social Context

15. Authority and the classroom. What sort of an authority figure is the teacher? Personal relationships and the teachers role.

16. Freedom and Equality in Education. The paradox of freedom. Equality in educational opportunity.

17. Democracy and Education. How 'democratic' can or should education be?

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The National Council on the Evaluation of Foreign Educational Credentials has several purposes: to establish priorities for research and publication of country or regional studies; to keep admissions officers and other interested persons as up-to-date as possible about changes in foreign educational systems; and to review and to modify as necessary recommendations drafted by World Education Series authors or others who might ask for such review. The composition of the Council changes as the constituent organizations appoint new representatives. Consistency among volumes is sought, despite changes in the Council's make-up, but still, some differences may occur. In voting on individual recommendations, decision is by simple majority. Council members are listed on the following page.

The recommendations attempt to cover all levels of formal education in roughly chronological order up through the highest degree conferred. They are based on the text of the book and should be used in conjunction with it. Recommendations, as developed through discussion and consensus in the Council, are not directives, but rather, are guidelines to help the admissions officer determine the admissibility and appropriate level of placement of students who have studied outside the United States. Admissions officers may wish to apply the recommendations flexibly, rather than literally.

The Council carefully phrases its recommendations. For example, a recommendation may state: "May be considered for up to three years of transfer credit." The implication is that the U.S. institution may consider giving less than or as much as three years of credit, the decision to be based upon many factors—age of the applicant's transfer study, applicability of the study to the U.S. curriculum, quality of grades, etc.

Certain recommendations may be identical; e.g., "May be considered for freshman standing" may be recommended for holders of two different kinds of diplomas. However, use of the same statement does not mean that the two diplomas are identical in nature, quality, or in the quantity of education they represent.

Also, while usually aware of educational policies in the country under study, the Council does not necessarily set its recommendations in conformity with the country's policies. Rather, the recommendations reflect U.S. philosophy and structure of education. For example, if in the country under study a secondary school graduate from technical studies is prohibited from entering university, the Council may still recommend consideration for freshman standing in the United States. Sometimes, in order to alert the reader to the fact that the prior education may be heavily specialized or notably different from U.S. education, another phrase may be added, such as "where such educational background is appropriate." It is assumed that admissions officers will read supporting pages in the text before making judgments in accordance with the policies of their own institutions.

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